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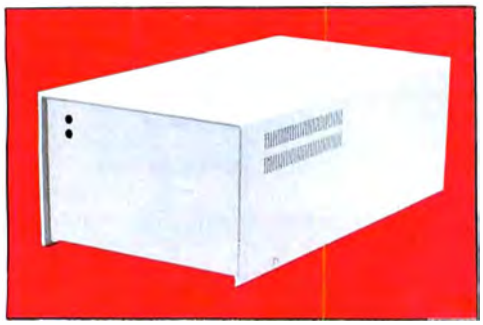

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DIGRESSIONS

Software Sells Computers

Infocom, Spinnaker, Imagic. Software companies such as these have a solid reputation for quality in this still young microcomputer business. Yet until recently, very few "big name" software developers had any interest in the Color Computer market. Now the above-mentioned companies and several of their peers are enthusiastically converting best-sellers for other systems to the CoCo.

Why? Tandy has made it worth their while. The newly formed Tandy Home Education Systems Division (T.H.E.S.) is offering these well-known software titles in bundled groups. (See The Learning Page, p. 76, for more information.) Unfortunately, you won't find most of this software in Radio Shack stores.

HOT CoCo applauds Tandy for soliciting such fine software for the CoCo. But wouldn't it be even nicer if you could walk into the local Radio Shack and pick up the latest Infocom adventure, or that new Spinnaker package to help Junior with his homework?

And the availability of this software is just the short-term benefit for CoCo owners. If these software companies have a way to effectively market their products to Color Computer users, you will see more sophisticated, new software for your pride and joy.

I don't mean to suggest that there currently is no good software available for the Color Computer. *Au contraire!* Though small by comparison, Color Computer software developers have equaled and, in some cases, outdone the big boys with their efforts. But because they are small, these companies have a tough time promoting their software. If the big software companies jump into the Color Computer market, there would be a "coattail" effect where the smaller companies benefit for three reasons: The new software would whet CoCo owners' appetites for more software; the best-selling titles available for the CoCo would spur the machine's sales, increasing the market for everyone; and once the precedent is established, perhaps some of the better existing software titles from smaller companies could also make it into Radio Shack stores.

Too many people consider Commodore and the now comatose Atari to be the glamour machines of the home market. The CoCo out-performs both; the general public overlooks the Color Computer because it is out-hyped not only by Commodore and Atari, but also by the promotion and popularity of the software available for their machines.

Simply put, software sells computers, even in the low-buck market. The more CoCos sold, the more you stand to gain in support from Radio Shack and all the companies developing Color Computer software.

Let's hope the T.H.E.S. project is successful. And let's encourage Tandy to open the door even wider for vendors of best-selling software packages.

New This Issue

We've made a few changes in *HOT CoCo* this month. First, we have discontinued The Educated Guest, by Charles Santee, and replaced it with The Learning Page, written by our new Education Editor, Nancy Kipperman.

Nancy's job is to keep her finger on the pulse of the CoCo education scene in both the home and school. Nancy encourages reader input, so please drop her a line to let her know what you think of the column.

We have also discontinued The DOSsier due to low reader interest. We apologize to those of you who have been following the column. The DOSsier's author, Scott Norman, will continue to write reviews and articles for *HOT CoCo.*

Richard Ramella of Elmer's Arcade fame returns this month with a new column, Mindbusters. Mindbusters will present computerized puzzles and brainteasers that will test the mental prowess of both you and your CoCo.

And finally, we have devoted a whole page to advice on using *HOT CoCo*. We hope this page make it easier for novices to enter and run our program listings. This is the first month of this feature, so let us know if it can be done better.

—Michael E. Nadeau■

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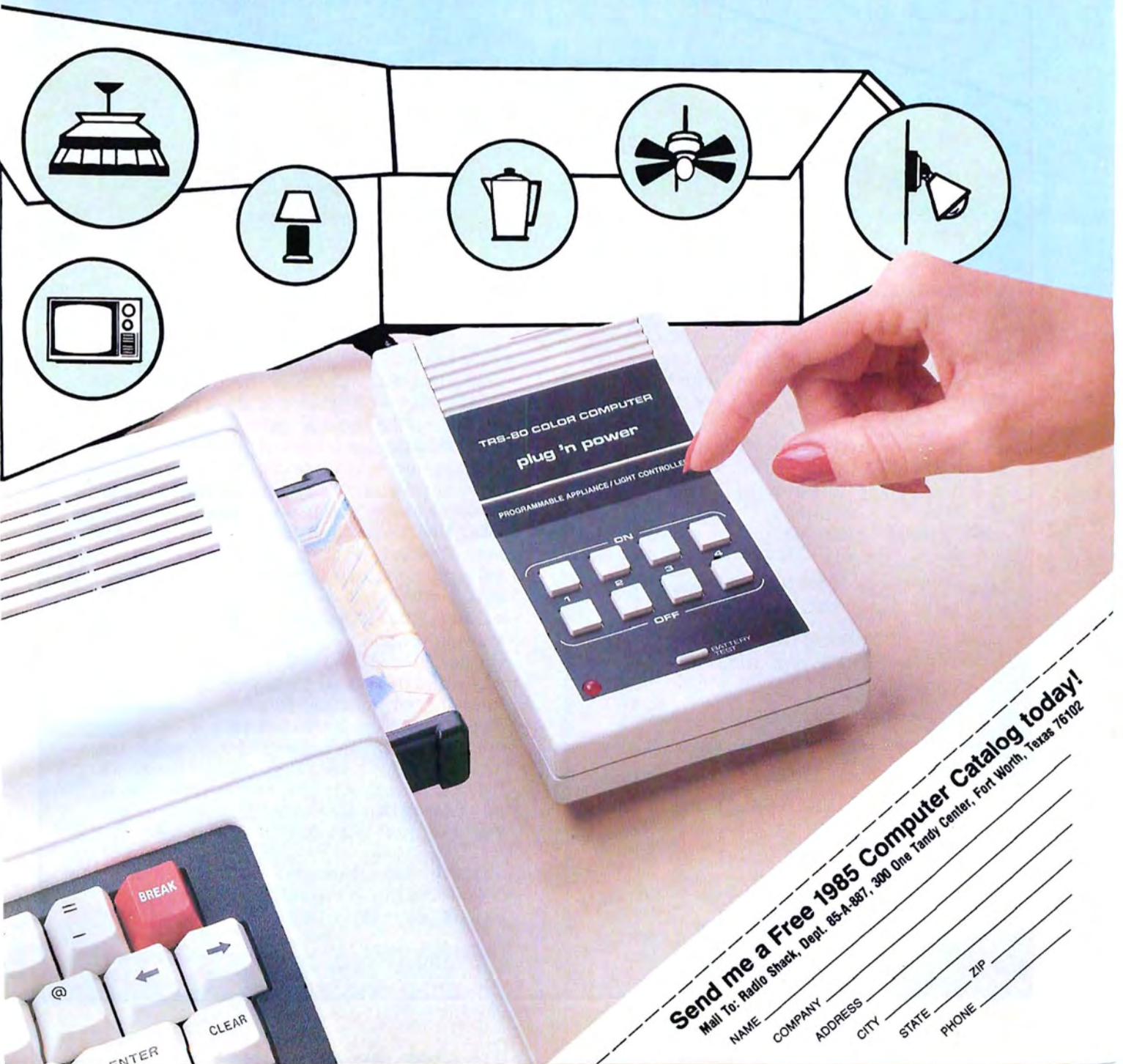

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June 1983—The CoCo word processor; a serial-to-parallel interface project; and the adventure, Cavehunt.
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September 1983—Disk utilities; hi-res character generator.
October 1983—Animation techniques; ROM disassembly, part I.
November 1983—Nuclear submarine simulation; ROM-pack primer; banner printer.
December 1983—World capitals quiz program; talking spelling tutor; vocabulary-building program.
January 1984—Programs for the businessman and investor; ins and outs of database management.
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March 1984—How a disk stores information; create your own wordsearch puzzles; dental/medical bill balancer.
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August 1984—Basic-09 review; database manager program; graphics tutorials; hurricane tracker.
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October 1984—A collection of sounds for your CoCo; how to make programs auto-execute; printer spooler.
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Instant CoCo Directory

Instant CoCo is a cassette tape containing the major programs from this issue of *HOT CoCo*. Its purpose is to save you the time and effort of typing long program listings into your Color Computer. You simply load the programs from the Instant CoCo tape using your cassette recorder. The instructions for operating each program are found in the corresponding *HOT CoCo* article. Both Basic and Assembly-language programs are included on the tape.

The Instant CoCo symbol appears in *HOT CoCo*'s table of contents and on the program listing for each article with a listing used on the Instant CoCo tape. As an added extra, each tape also contains a never-before-published Bonus Program, complete with instructions.

The directory below lists all programs included on this month's Instant CoCo cassette. Shown first are the name of the article with a descriptive blurb and its author, followed by the page number in this issue where the article appears. Next comes the file name of the program on cassette. Finally, there is a brief description of the Color Computer system needed to run the program.

This month's Instant CoCo cassette is available for just $11.47, including postage and handling, from ***Instant* CoCo, 80 Pine St., Peterborough, NH 03458.** See our ad on p. 64 for more details.

Side A

Article Name/Author/Description	Page #	File Name	System
Copyright Statement	---	TITLE	All
Paint King/Doucet Draw on the screen using joystick and symbols.	18	PNTKING	32K ECB
Space Hawks/Smith Get them before they get you.	22	SPHAWK	32K ECB
Trig It!/Roney Use math to create beauty on the video screen.	32	LIST1 LIST2 LIST3 LIST4 LIST5 LIST6 LIST7 LIST8 LIST9 LIST10 LIST11 LIST12	16K ECB
Do-It-Yourself Dumps/Berry Get a paper copy of your video creations.	40	SCRNDUMP	16K ECB
A Quick Fix For Your ROM/Meehan Convert 1.0 Disk ROM programs to work on the 1.1 Disk ROM. (CSAVEM "ROMFIXII",3584,4475,3927)	44	ROMFIXII	16K DECB 1.1 Disk ROM

Side B

Where Does the Value Go?/Weiss Figure depreciation on your investments.	54	VALUE	16K CB
ROM Hacker Part V/Barabarello Use these programs to control your Armatron robot.	58	RTD RC	16K ECB
Attention Shoppers!/Reed Add efficiency to your shopping.	65	SHOPLIST	32K ECB
Alphatoons/Ramella Teach young children the alphabet and keyboard.	68	ALPHATNS	16K ECB
Mindbusters—Mazemaker/Ramella Generate your own mazes.	72	MAZEMKR	16K ECB

*****Bonus Program*****

Easy Graphics Editor/Foti Enlarge and edit your graphics.	---	GRAPH-ED	16K ECB

CB = Color Basic, DECB = Disk Extended Color Basic, ECB = Extended Color Basic, (m) = machine-language program (use CLOADM)

HOT CoCo is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes 52 computer publications in 19 major countries. Members of the group include: Argentina's *Computerworld/Argentina*; Australia's *Australia Computerworld, Australian Micro Computer Magazine, Australian PC World and Directories*; Brazil's *DataNews* and *MicroMundo*; China's *China Computerworld*; Denmark's *Computerworld/Danmark* and *MicroVerden*; Finland's *Mikro*; France's *Le Monde Informatique, Golden* (Apple) and *OPC* (IBM); Germany's *Computerwoche, Microcomputerwelt, PC Welt, Software Markt, CW Edition/Seminar, Computer Business* and *Commodore Magazine*; Italy's *Computerworld Italia*; Japan's *Computerworld Japan* and *Perso ComWorld*; Mexico's *Computerworld/Mexico* and *ComputMundo*; Netherland's *CW Benelux* and *Micro/Info*; Norway's *Computerworld Norge* and *MikroData*; Saudi Arabia's *Saudi Computerworld*; Singapore's *The Asian Computerworld*; Spain's *Computerworld/Espana* and *MicroSistemas*; Sweden's *ComputerSweden, MikroDatorn* and *Min Hemdator*; the UK's *Computer Management* and *Computer Business Europe*; United States: *Computerworld, HOT CoCo, inCider, InfoWorld, jr, MacWorld, Micro Market World, Microcomputing, PC World, PC Jr. World, RUN, 73 Magazine* and *80 Micro*.

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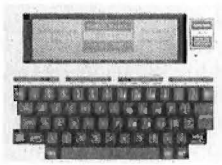

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Model 100 24K $625

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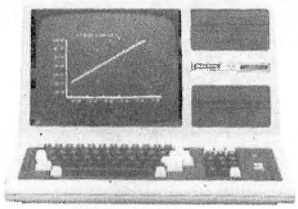
w/64K Ext. Basic $195



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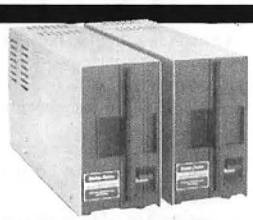
DMP120 $385



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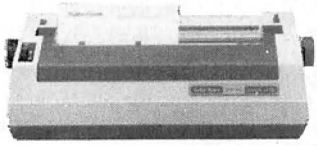

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How to Use *HOT CoCo*

Each month, *HOT CoCo* provides program listings for you to type into your Color Computer and use. If you are new to computing, read this page for advice that will help you avoid problems often encountered when entering programs manually.

Know the Basics

Before you begin, you should be familiar with the basic operation of your Color Computer. Read the manual and make sure you understand how to enter a program line, save a program to cassette or disk, and make corrections to a program line. The Color Computer manuals are well written, and you will enjoy your CoCo much more if you've read them.

Check the Requirements

The first thing you should do is make sure that the program you want to enter will run on your version of the Color Computer. You need to know the memory requirements, the type of Basic used (Color, Micro Color, Extended Color, or Disk Extended Color Basic), what peripherals might be needed, and in some cases whether a particular ROM version is needed. (See below for an explanation of the different ROMs.)

All this information is provided in the System Requirements box included with each article that has a program listing. This box gives the minimum requirements to use the program. If, for instance, the box reads "16K RAM, Color Basic," the program should also work on 32K or higher, Extended or Disk Extended Color Basic CoCos.

Once you've established that the program will work on your CoCo, read the article thoroughly. Sometimes it will include information vital to typing in the listing.

What You See Is What You Get

We print all Basic program listings 32 characters across—just as they appear on your video screen. Type in the listing exactly as it appears in the magazine, being particularly careful with spaces and punctuation. If you do this, the 32-character format will aid in proofreading what you have typed in by letting you match beginning and ending characters on corresponding lines. If you have a line that ends on a character other than what appears in the magazine, go back and check for a typo.

Common Errors

Some characters are easier to confuse than others when you are typing in program listings. And since your Color Computer interprets everything literally, the smallest error can crash a program. Below is a list of characters commonly confused with one another:

zero and the letter O
colon and semicolon
lowercase l and the numeral one
uppercase B and the numeral eight

Weird Characters

The up arrow indicates exponentiation on the Color Computer. Unfortunately, most printers do not have an up arrow. Our printer prints a caret (^) instead. Be sure to type an up arrow in place of all carets in Basic program listings.

Assembly-Language Listings

HOT CoCo often publishes programs written in Assembly language rather than Basic. Assembly listings "talk" to your computer on a much more direct level; Basic requires some translation before your CoCo can execute it. Therefore, Assembly works much faster than Basic. Unfortunately, it is more difficult to learn Assembly-language programming than Basic programming.

But you do not need to know how to program in Assembly to use these programs. You do need, however, something called an editor/assembler. An editor/assembler allows you to manually enter an Assembly listing, and then it "assembles" it into a form that your CoCo can execute. Since editor/assemblers can cost as much as $80, you probably don't need one unless you want to learn Assembly-language programming.

It is possible to hand assemble an Assembly listing, but this is a tedious process that is best left to someone with a little experience with Assembly programming. It also requires a short Basic routine that prepares your CoCo for hand assembly.

We convert some Assembly programs to Basic DATA statements and include a short Basic routine to load and execute the DATA statements. This gives you a program that you can type in just like a Basic listing, yet it operates much like one written in Assembly.

If you want to run one of *HOT CoCo*'s Assembly listings, but it hasn't been converted to DATA statements and you do not own an editor/assembler, check to see if the program is included on our Instant CoCo cassette. All Assembly programs on Instant CoCo are in assembled form, meaning you can load and execute them immediately.

Speaking of DATA Statements

Since DATA statements often consist of numbers only, it is easy to make a mistake typing them in. One wrong number can crash the program or lock up your machine. When this happens, the only way to recover is often to turn off the computer for a few seconds and then turn it back on. Of course, this wipes out your program in memory.

To avoid this, always save what you have typed in before running it. That way, if you did make a mistake, you can load the program from tape or disk to look for the error, rather than retyping the entire listing.

One last thing about DATA statements: Error messages that occur due to a mistyped DATA statement line will refer to the corresponding READ statement line earlier in the program. Yet it is the DATA statement that is incorrect.

If All Else Fails

If you cannot get your typed-in listing to run after checking and double-checking for typos, you can ask us for help. Send a detailed description of your problem along with any error messages given. Ideally we'd like a printout of what you typed. Send a self-addressed, stamped envelope for the fastest reply. Sorry, but we cannot help you if you have modified the original program in any way. Write to ***HOT CoCo*, attn. Technical Editor, 80 Pine St., Peterborough, NH 03458.**

Different ROMs

Radio Shack has updated the Basic ROMs in the Color Computer several times since it was introduced. Below is a list of the ROMs and the problems and benefits you might encounter with each one:

- Color Basic 1.0—Cannot fully use the 64K upgrade and has only a 7-bit serial printer routine, which inhibits sending graphics data to a printer.
- Color Basic 1.1—Fully supports 64K and has an 8-bit serial printer routine for graphics.
- Color Basic 1.2—Executes code faster than previous versions, but changed the way the ROM reads the keyboard. This makes some software written for the older ROMs incompatible with the 1.2 ROM. There is a simple fix, which *HOT CoCo* incorporates into every program in which this problem is encountered.

If you don't know what Color Basic ROM version you have, type EXEC 41175 after you first turn on your computer. The ROM version will be printed on the screen.

- Extended Basic 1.0—Has bugs in the PCLEAR, PRINT USING, and DLOAD statements.
- Extended Basic 1.1—Fixes the abovementioned bugs.
- Disk Basic 1.0—This is in the disk controller cartridge used with the grey CoCos and grey disk drives. The 1.0 Disk ROM is incompatible with the white 64K CoCos and CoCo 2s.
- Disk Basic 1.1—Works faster than 1.0, but you can use the 1.1 Disk Basic controller with the older, grey CoCos. Also, many routines have been moved, making some programs written using the 1.0 Disk ROM incompatible with the 1.1 ROM. (See "A Quick Fix for Your Disk ROM," by Mike Meehan, *HOT CoCo*, February 1985, p. 44, for a utility that overcomes this incompatibility in most cases.)■

Letters to the Editor

CGP-115 Screen Dump

Does anyone have a good word processor or screen dump for the CGP-115 printer? I have a 64K extended with cassette. I'd welcome programs from anyone out there. Your Feedback feature is fantastic.

Stephanie Rousseau
2800 Lambertville 01
Ste-Foy, Quebec, P.Q.
Canada, G1V-1B7

Color Computer Applications

Thank you for your review of *Color Computer Applications* in your September 1984 issue. I've had the book for eight months now and successfully run the programs on my MC-10. It's great for exploring design and animation possibilities.

Thomas Terry
Tallahassee, FL

No More Football

Radio Shack has discontinued making their ROM pack, Football, which was like putting a wounded dog out of its misery. However, I fail to see a viable replacement for this late, great game. What's going to happen to us armchair quarterback computer users?

David A. Czaba
Hamburg, NY

Repeat-Key Feature

Here is a repeat-key feature for all 64K Telewriter-64 users. Just make the following additions to your boot program (use a back-up copy only). If your disk drive will handle 6ms, then include line 310 (DOS 1.0 or 1.1 versions).

Jim Kalac
Boring, OR

```
305 POKE&H94A1,57:POKE&H94A2,0:P
OKE&H94A3,0:POKE&H94A4,&HBD:POKE
&H94A5,PEEK(&HA000):POKE&H94A6,P
EEK(&HA001):A=&H94A7
306 READA$:IFA$<>"X"THENPOKEA,VA
L("&H"+A$):A=A+1:GOTO306
307 POKE&HA000,&H94:POKE&HA001,&
HA4
310 POKE&HD6CD,0:POKE&HD723,20:'
FOR DOS 1.0:'POKE&HD7C0,0:POKE&H
D816,20:'FOR DOS 1.1
400 DATA 34,6,27,F,B1,94,A2,27,1
1,C6,1F,F7,94,A3,B7,94,A2,20,15,
B7,94,A2,35,6
410 DATA 4D,39,81,C,27,F5,7D,94,
A3,27,5,7A,94,A3,6F,E4
420 DATA CC,FF,FF,FD,1,52,FD,1,5
4,FD,1,56,FD,1,58,20,DD,X
```

Program Listing 1. Repeat-Key Feature

Making Noises Faster

Philip McLaughlin in "Making Noises" (*HOT CoCo*, October 1984, p.34) gives a good example of efficiency in programming under the heading Octaves. However, the FOR. . .NEXT loop as presented in lines 230–260 can be made faster by removing the "string" manipulation.

The technique below can be applied to the DRAW statement as well as the PLAY. It isn't new and probably was found by disassembling Basic.

As per article:

```
230FOR LOOP = 1TO5
240O$ = "O" + STR$(LOOP)
250PLAYO$
255PLAY"1;2;3;4;5;6;7;8;9;10;11;12;"
260NEXT
```

Suggested code:

```
1FOR L = 1TO5
2PLAY"O=L;1;2;3;4;5;6;7;8;9;10;11;12;"
3NEXT
```

Be sure to have a semicolon after the "=Variable" or you'll get a function-code (FC) error.

Robert Gault
Grosse Pointe Woods, MI

Croaker Series Addition

Here is a method to assemble Croaker on Tandy's EDTASM+. Croaker must be assembled using the AO (absolute origin) option. In other words, assemble it to tape with A/AO/WE.

The AO option must be used on all six parts so the object code will begin at the origin address listing at the beginning of the source code. Otherwise, the object code will be assembled wherever the assembler has free memory. This will cause the game to run incorrectly, and Part 4 will even return error messages.

Mike Meehan
Clearwater, FL

QType Clarified

Several people have written to me about the problems they experienced with "QType" (*HOT CoCo*, November 1984, p.30). There is some confusion about the arrows in lines 50 and 120. The footnote (change all underline characters to up arrows when typing this in) should be ignored. The first arrow (pointing to the left) should be just that: an arrow pointing to the left. It is the underline that should be ignored. The arrow pointing to the left is CHR$(95) and is generated by holding down the shift key and then pressing the up arrow key.

Robert E. Cutter
Los Angeles, CA

Mead Data Central Access Increased

An article by Bobby Ballard in the September *HOT CoCo* (p.82) includes two inaccuracies about the database services of Mead Data Central.

The article states that the information retrieval services are only available through Mead Data Central terminals. This has not been true since December 1983, when users of the IBM PC, IBM Displaywriter, IBM 3101, and TeleVideo 950 first gained access.

Since then, Lexis, Nexis, Lexpat, Exchange, NAARS, InfoBank, Eclipse, and other Mead Data Central services have become accessible through the IBM 3270 PC, IBM Portable PC, Wang Professional Computer, Apple III, Xerox 820-11, and the new AT&T Personal Computer. Access is expected soon through the Apple Macintosh, Apple IIc and Apple IIe, as well as through other popular micros and terminals.

Also, Mr. Ballard suggests that Lexis, Nexis, and Lexpat are "specifically geared to lawyers and communications professionals." In fact, Mead Data Central's services are also used by executives and staff in advertising, government, engineering, finance, public affairs, business analysis, and any other field where fast, thorough research is valued. Lawyers and communications specialists are certainly major users of the Mead Data Central database but not exclusive ones.

Andrea Axelrod
Jeffcoat Schoen & Morrell Inc.
New York, NY 10021

Oops!

*The Systems Requirements for "Machine-Language Disk I/O" (*HOT CoCo, *December 1984, p. 70) should read: Disk Basic ROM 1.0.*

*In Doctor ASCII, SDUMPX2 (*HOT CoCo, *December 1984, p.89) has a number missing in line 410. Line 410 should read: DATA 27, 90, 0, 27, 65, 8, 13, 255, 0, 0. This will return the printer head on the Gemini 10X to the left side of the page and move down a line.—eds.*

The Korean CoCo

Radio Shack has just released its sixth version of the CoCo motherboard since the computer's inception in 1980. The predecessors were the C, D, E, F, and original CoCo II motherboards.

The newest 16K CoCo IIs with the raised keyboard (Catalog #26-3134 and #26-3136) are now being manufactured in Korea. I was surprised at what I saw inside this new machine. The 6847 VDG, the 6809E CPU, and the

Letters to the Editor

two ROM chips (Extended and Basic) were no longer socketed! After overcoming this shock, I saw the reality of manufacturing a machine that will now retail for less than $100. Elimination of sockets by wavesoldering these chips saves production costs and helps Tandy meet these new price points.

The RAM chips are now aligned in two rows with three on the top and five on the bottom. These chips and the 6883 SAM chips are the only chips that have sockets on this new board. Upgrading to 64K is still extremely easy. The RAM sockets are still numbered 14-21, but there are no more W1 solder pads. Instead, between resistors R7 and R27 at the lower left side of the board is a white rectangular box with two solder pads inside it.

On the top of the box, it says 64K RAM and on the bottom, it reads J1. Run a jumper between these two pads and replace the 5V 16K chips with (eight) 64K RAMs, and voila, you now have 64K. It is also easier to run this jumper than it was on the W1 pads because now it is more in the open.

The 5-amp regulator has been replaced with a 1-amp regulator, and the 6822 PIA chip has been replaced with a Motorola 67331 chip. Also, the RF modulator is now parallel to the board, and the power supply is enclosed inside a cage. Finally, a part of the board actually extends underneath the keyboard and gives you the overall impression of a smaller motherboard.

Bob Rosen
President, Spectrum Products
San Jose, CA

Speed Up Night Racer

I found "Night Racer" (*HOT CoCo*, November 1984, p. 52-60) to be an interesting game. With some minor changes in Listing 18 (Main Program), you can have a "turbo boost" available by pressing the space bar and holding it down. See the changes in Program Listing 2. I also found an error that prevents you from setting your own level. To correct this, insert line 230. These changes add some more challenge to the game.

Robert A. Essig
Ashtabula, OH

```
34 IF PEEK(345)=247 THEN POKE 65
495,Ø:POKE 345,255:GOTO4Ø:ELSE P
OKE 65494,Ø
36 FOR T = 1 TO 2*3:NEXT T
4Ø IF PEEK(1Ø24+C)<> 144 THEN9Ø
9Ø POKE 65494,Ø:RC=RC+1:FORE=8TO
ØSTEP-1:CLSE:SOUND5,1:NEXTE:IF R
C=3 THEN 33Ø ELSE FOR E=ØTO48ØST
EP32:PRINT@E,BL$;:NEXTE:GOTO6Ø
23Ø C$=CHR$(175):C=495
```

Program Listing 2. Night Racer Changes

Send your letters to Letters to the Editor, HOT CoCo, 80 Pine St., Peterborough, NH 03458.

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String Functions:	CHR$, LEFT$, MID$, RIGHT$, LEN, INSTR, LSET, RSET, TRM$, STR$, STRING$, INKEY$, MKN$
Numeric Functions:	ABS, POS, TIMER, RND, ASC, TAB, CAL, JOYSTK, PEEK, POKE, LOC, LOF, EOF, FREE, CVN, ERR, VARPTR, SWAP
I/O Commands:	OPEN, CLOSE, INPUT, LINEINPUT, PRINTWRITE, PRINT@, GET, PUT, KILL, CHAINM, FIELD, DATA, READ, RESTORE
Program Control:	FOR/NEXT/STEP, GOTO/GOSUB, IF/THEN/ELSE, RETURN, STOP, IF THEN GOTO/GOSUB, ON ERROR, ON RESET, ON IRQ/FIRQ/NMI, ON OVR/NOVR, EXEC, LET
Directives:	ORG, REM OR', END, DIM, END, BASE, RAM ON/OFF, RAM64K, HIRES, GF, NERATE, DPSET, STACK
Editor Commands:	LINE EDIT, AUTO EDIT, COPY, MOVE, RENUMBER, AUTO LINE#, PRINTER, LIST, DELETE, SEARCH, REPLACE, BAUD RATE, PRINTER CBASIC, TAPPEND, SKIP, SIZE, LOAD, SAVE, APPEND, KILL, DIR, and much, much more.

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Upper/Lower case characters	Yes	Yes	Yes
Mixed Text and Graphics	Yes	Yes	Yes
Separate Text & Graphics	Yes	Yes	No
Print @ fully implemented	Yes	Yes	Yes
Print @ on all line lengths	Yes	Yes	51 only
Different line lengths	28 to 255	28 to 255	51 only (1)
Automatic Key Repeat	Yes	Yes	Yes
Adjustable Key Repeat	Yes	No	No
Auto Repeat Disable	Yes	No	No
Erase to end of line/screen	Yes	Yes	Yes
Home Cursor	Yes	Yes	Yes
Solid or Blinking Cursor	Yes	No	Yes
CLS command supported	Built/Black	Built/Black	Built/Black
XY Coordinate Cursor Positioning	Yes	Yes	No
Double Size Characters	Yes	Yes	No
Individual/Continuous Highlighting	Yes	Yes	No
On Screen Underlining	Yes	Yes	No
Clear Key functional	Yes	Clear/Home key	Yes
16/32 & 64K Supported	Yes	Yes	Yes
Green or Black Background Color	Yes	No	No
Dual Character sets for Enhanced 64 and 85 Characters per line display	Yes	No	No
Protected Screen Lines (programmable)	1 to 23	No	No
Full Control Code Keyboard for Screen control directly from the keyboard	Yes	No	No
Programmable Tab Character Spacing	Yes	No	No
Full Screen Reverse Function	Yes	Yes	No
Switch to & from the Standard 16 by 32 Screen for full compatability	Yes	No	No
On Error Goto Function	No	No	Yes
Extended Basic Required	No	Yes	Yes
All Machine Language Program	Yes	Yes	Yes
RAM Required in addition to Screen RAM	2K	2K	2K
Program Price (Tape)	$24.95	$19.95	$29.95

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The Basic Beat

DATAmania

by James W. Wood

Need to store any information? Want an easy way to create a computerized greeting card, or how about a quiz that shuffles the questions? The Basic Beat presents DATAmania, lessons in using the DATA statement to achieve these and other programming tricks.

Program Listing 1 isn't very exciting, but I have to start somewhere. It uses READ and DATA together; each one is useless without the other. Your CoCo won't notice DATA without READ, and a READ without DATA will create an OD (out of data) error. In the listing, READ A$ looks for a string variable in a DATA line. It finds *HOTCoCo* and then prints A$, in this case, *HOT CoCo*.

Program Listing 2 uses a variable without a dollar sign ($). Here, the READ assigns the value it finds in a DATA line to the variable, W. Therefore, it prints 49.

READ can recognize more than one value. Line 20 in Program Listing 3 reads five variables and uses them in an equation. Notice the location of the DATA line in all three listings: Its placement isn't critical. If I'm writing a program with a few DATA lines that I won't add to later on, I place them near the READ statement. If my program contains a lot of data that I might change later, I prefer to place this data at the end of the program listing.

The first READ statement reads the DATA in the lowest numbered DATA line. Therefore, if there are two READ statements in a program, make sure that the DATA for the first has a lower line number than the DATA for the second.

Program Listing 4 lets you store names and perhaps an ID number. You could change the variables that read the numbers from N to N$, because any number that isn't used in an arithmetic calculation can be stored and read as a string. For example, you rarely use telephone numbers in an addition or multiplication problem. If the computer read long ID numbers as numbers instead of strings, it would tend to change them to scientific notation. The CoCo couldn't read a phone number with a hyphen (-) separating the digits as a numeric variable. As a rule, store your numbers as strings if you are not going to use them mathematically.

Listing 4 shows signs of usefulness, but it only prints bunches of information. You couldn't use it for a computer search. The program does illustrate, however, that the number of items in the READ line doesn't have to match the number of items in the DATA line. The program keeps track of the ones it has read, and the next READ begins with the next item that hasn't been read. The item can be in the same DATA line, or on another.

Program Listing 5 is a telephone search. With numbers and names stored in the DATA lines, you can search for a number that corresponds to a name you enter, or you can search for a name that has a certain number. Finding the right phone number by typing in your cousin's name sounds like a good idea, and a reversed search also helps when you jot a number on a piece of paper, then come across it later and can't remember who the number belongs to.

See if you can get Listing 5 to find the correct information when you give it only part of a name. Lines 30–60 give you the choice of searching by name or number. Lines 70–130 search by number. You might want to modify the instructions for numbers that include an area code. NW is a variable stored in line 250. It tells how many names and numbers are in the list. To add or delete DATA lines, you only need to change the number of names in line 250.

Line 130 is what's known as "user friendliness." Line 110 sets F equal to 1 if it finds a match. If F isn't made equal to 1, then line 130 prints "None Found." Lines 150–210 search for a number to go with a name. These lines work the same as do lines 70–130. Line 230 RESTOREs the DATA and sets F equal to 0 again. The RESTORE causes the next READ to read the first data item; otherwise, you'll get an OD error.

Program Listing 6 is an example of an electronic birthday card. It shows that not only can the computer print DATA items; it can also use them to locate a PRINT; it can SOUND them; or it can SET, POKE, or use them with any Basic command.

Line 20 reads four numbers. These indicate a PRINT@ position, a string to print, a tone, and the length of the tone. You can change the "per" and "son" in lines 220–230 to a real person's name. The lowercase letters appear on your screen as green letters on a black background. Use a shifted 0 to change to lowercase, and again to return to uppercase.

Program Listings 7a and 7b perform the same tasks: Each one displays a star design. Listing 7b uses fewer SETs and parentheses, which makes it easier to type, but it's harder for a beginner to understand.

Program Listings 8a and 8b also do the same jobs: Each draws my special tomato worm. As graphic strings become longer, use the DATA method of storing CHR$ graphics—unless you like to type hundreds of +CHR$( )s.

Program Listing 9 is an improved version of the quiz program in the January Basic Beat. It still uses an array to store questions, and it shuffles the questions. The program reads the questions

and answers into an array instead of setting each one equal to an element of the array. For example, S$(1) = "ILLINOIS":C$(1) = "SPRINGFIELD." This way, the DATA lines are much easier to read than they would be otherwise. You could easily modify Listing 9 to use it with other types of questions (e.g., presidents and vice presidents, elements and their symbols, or animals and their scientific names).

Program Listing 10 shows the popular method of reading data to POKE a machine-language program into memory. Run the listing and move your right joystick from side to side. Impressive, isn't it? If you own a 4K machine, change each 16000 to 4000.

Program Listing 11 is my introduction to next month's Basic Beat. It will include lots of fast-moving graphics, so pick up a copy and find out why they call it the Color Computer. ■

Address correspondence to James Wood, 424 Missouri, Box 507, Atwood, IL 61913.

```
10 READ A$
20 DATA HOT COCO
30 PRINTA$
```

Program Listing 1

```
10 READ W
20 PRINT W
30 DATA 49
```

Program Listing 2

```
10 DATA 4,5,6,7,8
20 READ R,S,T,U,V
30 Z=(S+U+V)/(R+T)
40 PRINTZ
```

Program Listing 3

```
10 FORA=1TO6
20 READ NA$,N
30 PRINTNA$,N
40 NEXTA
50 DATA FRED,72,GEORGE,95
60 DATA HARRY,63,BILLIE,86
70 DATA BRENDA,94,PAMELA,78
```

Program Listing 4

```
10 CLS
20 PRINT"SEARCH BY (P)HONE OR (N
)AME"
30 PRINT"TYPE FIRST LETTER AND '
ENTER'":INPUT Q$
40 IF Q$="P" THEN 70
50 IF Q$="N" THEN 150
60 GOTO30
70 PRINT"ENTER NUMBER AS 'XXX-XX
XX'":INPUT PW$
80 READ NN
90 FOR A=1 TO NN
100 READ P$,N$
110 IF P$=PW$ THEN PRINTN$:F=1
120 NEXT A
130 IF F=0 THEN PRINT"NONE FOUND
"
140 GOTO 220
150 INPUT"NAME";NW$
160 READ NN
170 FOR A=1 TO NN
180 READ P$,N$
190 IF N$=NW$ THEN PRINT P$:F=1
200 NEXT A
210 IF F=0THENPRINT"NONE FOUND"
220 INPUT"ANOTHER SEARCH (Y/N)";
J$
230 IF J$="Y" THEN RESTORE:F=0:G
OTO20
240 IF J$="N" THEN END ELSE 220
250 DATA 5
260 DATA 555-3452,FRED HILL
270 DATA 555-1923,HARRY SMITH
280 DATA 555-3490,BILL JONES
290 DATA 555-8867,GEORGE PATTAR
300 DATA 555-6295,TREVOR MOORE
```

Program Listing 5

```
10 CLS0
20 FORA=1TO26:READA$,P,T,D
30 PRINT@P,A$;:SOUNDT,D:NEXTA
40 DATAhap,133,89,2
50 DATApy,136,89,2
60 DATAbirth,139,108,4
70 DATAday,144,89,4
80 DATAto,148,133,4
90 DATAyou,151,125,8
100 DATAhap,197,89,2
110 DATApy,200,89,2
120 DATAbirth,203,108,4
130 DATAday,208,89,4
140 DATAto,212,147,4
150 DATAyou,215,133,8
160 DATAhap,259,89,2
170 DATApy,262,89,2
180 DATAbirth,265,176,4
190 DATAday,270,159,4
200 DATAde,274,133,2
210 DATAar,276,133,2
220 DATAper,279,125,4
230 DATAson,282,108,4
240 DATAhap,325,165,2
250 DATApy,328,165,2
260 DATAbirth,331,159,4
270 DATAday,336,133,4
280 DATAto,340,147,4
290 DATAyou,343,133,8
300 FORT=1TO100:NEXTT:FORT=1TO50
:CLSRND(9)-1:NEXTT:CLS
310 CLS
```

Program Listing 6

```
10 CLS0
20 SET(12,1,3):SET(48,1,4)
30 SET(20,8,4):SET(40,8,3)
40 SET(2,15,4):SET(16,15,3)
50 SET(30,15,5)
60 SET(44,15,4):SET(58,15,3)
70 SET(20,22,4):SET(40,22,3)
80 SET(12,29,3):SET(48,29,4)
90 GOTO90
```

Program Listing 7a

```
10 CLS0
20 FOR A=1 TO 13:READ X,Y,Z
30 SET(X,Y,Z):NEXT A
40 GOTO40
50 DATA 12,1,3,48,1,4,20,8,4
60 DATA 40,8,3,2,15,4,16,15,3
70 DATA 30,15,5,44,15,4,58,15,3
80 DATA 20,22,4,40,22,3,12,29,3
90 DATA 48,29,4
100 GOTO100
```

Program Listing 7b

```
10 CLS0
20 A$=CHR$(188)+CHR$(142)+CHR$(1
58)+CHR$(158)+CHR$(254)+CHR$(254
)+CHR$(158)+CHR$(142)+CHR$(138)
30 PRINT@170,A$;
40 GOTO40
```

Program Listing 8a

```
10 CLS0
20 FORA=1 TO 8:READ C
30 A$=A$+CHR$(C):NEXT A
40 PRINT@170,A$;
50 GOTO50
60 DATA 188,142,158,254,254,158,
142,138
```

Program Listing 8b

```
10 CLS:CLEAR300
20 N=10:DIM S$(N),C$(N),P(10)
30 FOR A=1 TO N:READ S$(A),C$(A)
:NEXT A
40 FOR A=1 TO N:P(A)=0:NEXTA
50 FORA=1 TO N
60 R=RND(N):IF P(R)=1 THEN 60 EL
SE P(R)=1
70 PRINT"WHAT IS THE CAPITOL OF
";S$(R)
80 INPUT CW$
90 IF CW$=C$(R) THENPRINT"CORREC
T":C=C+1 ELSE PRINT"SORRY, IT IS
 ";C$(R)
100 NEXT A
110 PRINT"YOU GOT";C;"OUT OF";N;
"CORRECT"
120 INPUT"PLAY AGAIN (Y/N)";PA$
130 IF PA$="Y" THEN 40 ELSE IF P
A$="N" THEN END ELSE 120
140 DATA ILLINOIS,SPRINGFIELD
150 DATA NEW HAMPSHIRE,CONCORD
160 DATA ALABAMA,MONTGOMERY
170 DATA COLORADO,DENVER
180 DATA DELAWARE,DOVER
190 DATA GEORGIA,ATLANTA
200 DATA MONTANA,HELENA
210 DATA INDIANA,INDIANAPOLIS
220 DATA NEVADA,CARSON CITY
230 DATA SOUTH CAROLINA,COLUMBIA
```

Program Listing 9

```
10 CLEAR200,16000
20 FOR A=16000 TO 16019
30 READ B:POKE A,B:NEXT A
40 DATA 189,169,222,182,1,90,139
,128,142,4,0,167,128,140,6,0,38,
249,32,236
50 EXEC 16000
```

Program Listing 10

```
10 CLS8
20 FOR A=1 TO 32:A$=A$+CHR$(255)
:NEXT A
30 B$=A$+"BASIC"+CHR$(255)+"BEAT
"+A$
40 FORA=1TO42:SOUND RND(200),1:P
RINT@160,MID$(B$,A,32);:NEXT
50 GOTO40
```

Program Listing 11

TEXTPRO III— A KEY TO BETTER WORD PROCESSING

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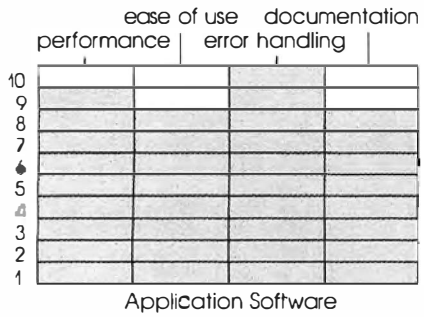

TextPro III, V3.2 (disk)
Cer-Comp
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702-452-0632
64K, Extended Color Basic
$49.95 cassette
$59.95 disk

If you're looking for a powerful, easy-to-use, disk-based word processor that provides full access to all your printer's special features, consider TextPro III. This word processor is designed for the 64K Color Computer, and Cer-Comp makes versions that work with the Word-Pak 80-character video cartridge and the TG-99 disk system.

TextPro III is actually two programs in one. It's a text editor that creates ASCII files of up to 156K in length, and a text processor that prints ASCII files. Imbedded commands let TextPro III format text for printing.

With TextPro III, the only limitation to the length of your files is the amount of space available on your data disk, not the memory available in your computer. In a 64K computer, TextPro III gives you a text buffer of approximately 44,000 characters. If you need more than that, you can "roll" part of your text buffer's contents onto your data disk. On a single-drive system the practical limit to the text is half the space of a blank data disk, which on a standard Radio Shack data disk works out to be about 43 double-spaced pages of print. You need two files to work with any manuscript longer than the memory available in your computer—one for the input file and one for the output file. The output file contains all the changes you made to the input file.

Illustration by Nina Winters

If you have a two-drive system, the file size limit is the full space available on a disk (156K) because you can put the input-file data disk in one drive and the output-file data disk in the other drive. However, a file can't span more than one data disk.

This approach to large file handling does have a drawback. If there is a power failure, a power fluctuation that lasts long enough to affect your computer's memory, or any problem that forces a restart of the computer, you will not only lose your latest, unsaved corrections in memory, but also the entire output file. TextPro III has to properly close a file or else the DOS simply ignores it. If this makes you nervous, the best solution is to make disk backups frequently. If your file is small enough to fit entirely in memory, this is not a problem; in the event of a power failure, you lose only what's in memory, not what's on the disk.

TextPro is a line-oriented word processor that operates like a typewriter.

You type until you reach the right margin and then press the enter key to return to the next line. A tone sounds to warn you that you are only 10 characters away from the end of the line. The line length is preset at 80 characters, but you can set it to any value up to 255 by using the LLINE command. At the end of a line, you can press either the enter key to go to the next line, or the clear key to keep typing on that line. No line can exceed 255 characters.

Unlike a typewriter, you have to number each line of text with this program. However, it does have an automatic line-number routine for long periods of typing. You need line numbers because they are the main method of manipulating text for editing. You use them to specify lines for listing, moving, copying, deleting, string searching, and string replacing. String search and string replacement are limited to text that is contained in one line. The program lists exact matches only.

Suppose you are looking for the ASCII string "the answer." If one line has "the" and the next has "answer", the string won't match. The only way to find it is to search for either "the" or "answer" separately, which might take a little longer. Similarly, the program does not read upper- and lowercase strings of the same letters as the same string. Searching for "Basic" won't glean "basic" or "BASIC."

After you create a text file, you want to edit it. Like Basic, TextPro uses a separate edit mode for altering lines. In this mode you can move left and right on a specified line, insert and delete characters, move to the beginning or end of the line, exit the edit mode without storing changes, exit the edit mode and save the changes, chop off a line from the point where you locate the cursor and exit the edit mode, go back to the previous line, and go on to the next line. Changing lines in the exit mode erases any changes you've made.

TextPro III lets you switch off between a high-resolution display and the normal 32-column by 16-row display the CoCo provides. The background color in the hi-res mode is adjustable. The hi-res screen is particularly helpful for preparing text files with margins wider than 64 characters, but the characters become too small to read.

Text Processing

TextPro III prints your documents according to the line length you select. The program ignores the line lengths you might use in the edit mode. TextPro breaks up lines in your manuscript that are no longer than the line length you select. It adds together lines that are shorter than you have specified. You can turn off this feature for printing tables or other special documents that you want printed exactly as you enter them. You can also set the program for left, right, or full-justification.

Most of TextPro's commands are the same as other word processors, but its footnote, tab, text-repeat, and character-fill options are unusual and extremely useful. Students, professors, and researchers might find it invaluable to be able to place footnotes at the bottom of the page automatically and without complex calculations. The justification options and the tab settings make graphically complex tables easy to create. The text repeat command, when used in conjunction with the text input command, can help you develop personalized form letters or notices. And the character-fill command reduces the room you need to make page banners and other attention-getting devices.

The TextPro III manual has more than 60 8½- by 11-inch spiral-bound pages. It is divided into three sections: the editor commands, the processor commands, and a 20-page tutorial. In spite of a few typographical errors, the manual does a good job of describing and explaining how to use the program.

TextPro III is a powerful word-processor. To me, it has just one, albeit minor, flaw: It doesn't automatically drop and return to the next line when you are entering text. You must press the enter key at the end of a screen line. I'm used to other systems that enter automatically. But you aren't likely to be bothered by this if you are used to a typewriter for generating text. Despite this minor inconvenience, TextPro III is loaded with smart features that make it a word processor to consider.■

Address correspondence to Terry Kepner, P.O. Box 481, Peterborough, NH 03458. Terry Kepner is a free-lance writer and programmer. He writes monthly columns for 80 Micro, Portable 100, and HOT CoCo magazines. He's been writing about computers since 1979.

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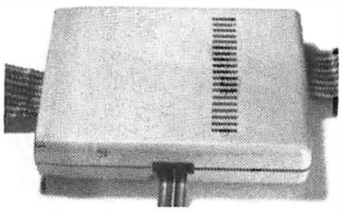

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BY JOEL DOUCET

Paint King

Symbols and a Color Mouse or joystick are the reasons why Paint King is a joy to use.

Paint King lets you create high-resolution color pictures easily using only one joystick or the Color Mouse. The only time you have to use the keyboard is when you wish to draw hi-res characters, or to specify a file to be loaded or saved.

Paint King is as easy to use as possible. The screen is divided into two sections. At the left is the menu section, which covers about one-third of the screen. The rest of the screen is devoted to actual drawing space. To choose a function from the menu, use the right joystick or mouse to position cross hairs over the symbol for the function you want, then press the right joystick or mouse button until you hear a beep.

When you move the cross hairs over to the drawing portion of the screen, they'll change to a single dot, whose use is dependent upon the function you chose. This only happens with the first menu, since the second one doesn't have any functions that require on-screen drawing.

Draw and Paint

The line function allows you to draw a line at any angle between two points. To begin, you move the dot cursor on the drawing screen, pressing the button when you wish to set the starting point for your line. After this, when you move the dot, a line is drawn and erased swiftly as the dot moves. When you wish to make the line permanent, simply press the button again.

With the paint function, you can paint inside the black areas of the screen with 255 different colors and textures. This is accomplished in the program with the commands "POKE 178,CC" and "PAINT(H,V),,1". The variable CC should have a value in the range (0–255), which will be the color code the PAINT command will use. This POKE command can also control the color for the LINE and CIRCLE commands, but this feature isn't used in this program. Try it in your own programs and don't be afraid to experiment. With a little practice, you'll see great results.

When you choose the paint function, you see the paint color displayed in the rectangle above the menu symbol (a paint brush). If you hold the button down, new colors are displayed until you release it. Then you can paint by moving the cursor dot to the area you wish to paint and pressing the button. Before painting, you must make sure that the area you wish to paint is completely bounded by a solid color. Trying to paint in one of the non-standard textures often results in unexpected but interesting effects. The clear function, which is spelled "CLR" in the menu, simply clears the drawing screen.

Other Functions

To use the hi-res character function, choose the proper menu item, move the dot cursor to where you want to write, and then press the button. The program writes characters or numbers on the screen as you type them, until you press the button again.

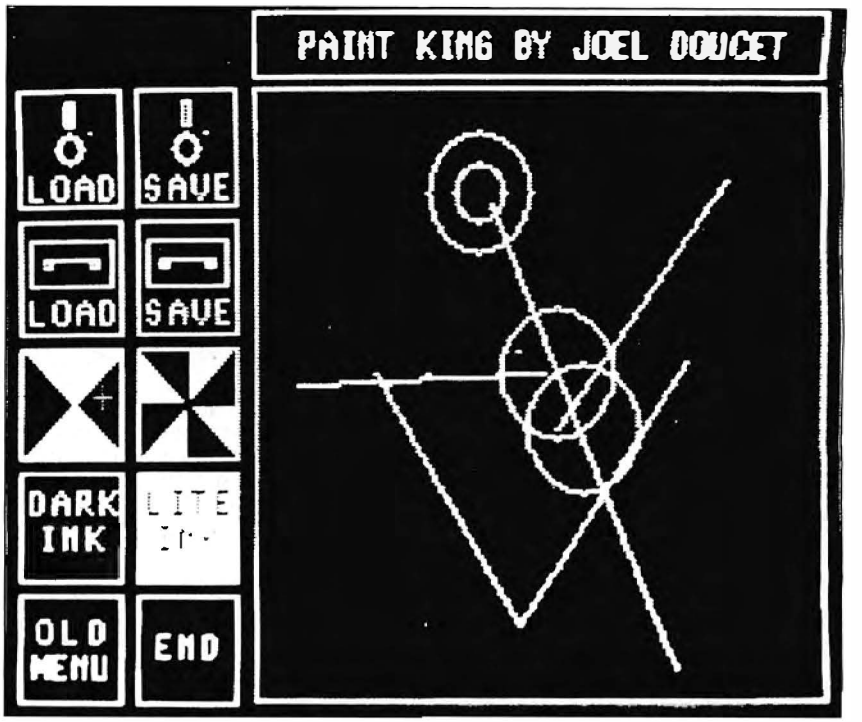
The erase function lets you erase parts of the screen in small, block-shaped chunks. You move a small flashing square on the screen, and when you press the button, the area under that square is erased.

The circle function lets you draw circles easily. Simply move the cursor dot to where you want the center of the circle to be and then press the button. To shrink the circle, move the joystick to the left; to enlarge it, move the joystick to the right. Press the button again to make the circle permanent.

The save function lets you save a copy of your picture in memory so it's protected while you make changes. The

System Requirements
32K Extended Color Basic
Cassette or Disk
1 Joystick or Color Mouse

This program is available on our Instant CoCo cassette.
See the Instant CoCo ad elsewhere in this issue.



draw function instantly redraws a picture that has been saved. Choosing the next menu item displays the program's second menu of functions.

The fast function uses the speed-up poke, POKE 65495,0, to make the program run faster. Choosing this function a second time slows the computer down by executing a POKE 65494,0 command. If your computer can't handle these POKEs, don't use this function. Always make sure the computer is in slow mode before doing any loading or saving to tape or disk. Not paying attention to this advice won't hurt the computer, but funny things may happen.

The I/O (input/output)device, load, and save functions let you load or save a screen to tape or disk. Simply choose the function you want, press the button, and type in a file name, which must be eight characters long. Caution—A file saved to tape without the disk controller won't load when it's plugged in. The converse is also true. The invert function lets you invert all the colors on the drawing screen.

The screen function switches the screen between the green screen mode and the bright "false color" screen mode. The two ink functions allow you to choose either light or dark ink for your lines and circles. The old menu function simply returns you to the first menu. The end function ends the program.

That's all there is to it. With just a bit of practice, you'll soon draw colorful hi-res pictures easily. Have fun!■

Joel Doucet is an educational-software writer and author of Owl-Ware's Stellar Search program. Write him at R.R.#1, Box 3479, Yarmouth, Nova Scotia, Canada, B5A 4A5.

Program Listing 1.

```
Ø CLS:CLEAR:PCLEAR8:PMODE4,5:PCL
S:PMODE4,1:PCLS:C1=1:PO=1:DIMM1(
Ø,316),M2(Ø,316),IS(Ø,713)
1 DIMO$(36):FORX=ØTO36:READA$:O$
(X)=A$:NEXTX:DATAU4E2F2D1L4R4D3,
U6R2F1D2L3R3D2G1L2,BU1F1R2E1G1L2
H1U4E1R2F1,U6R2F1D4G1L2,R3L3U3R2
L2U3R3,U3R2L2U3R3,U5C1R1E1H1L1G1
D5R3U3L1,U6D3R3U3D6,BR1R2L1U6R1L
2,U2D2R3U6,U6D3R1E1U2R3,U6D6R3,U
6F2D2U2E2D6,U6F3D3U6
2 DATABU1F1R2E1U4H1L2G1D4,U6R3D3
L3,U6R3D6L3R3H1F2,U6R3D3L3R1F3,B
U1F1R1E1U2L3U2E1R1F1,BR1U6R2L4,U
6D6R3U6,BU2U4D4F2E2U4,U6D6R2U3D3
R2U6,U1E4U1D1G2H2U1D1F4D1,BR1U3H
2U1D1F2E2U1,R3L3U2E3U1L3,BU1F1R2
E1U4H1L2G1D4,BR1R2L1U6G1,R3L3U1E
1H1U2H1L1G1
3 DATABU1F1R1E1U2L2R2U2H1L1G1,BR
2U6D3R1L4U3,BU1F1R1E1U1H1L2U3R3,
BU1U4E1R1F1H1L1G1D4F1R1E1U1H1L1,
U1E3U2L4,BU1U4E1R1F1D4G1L1H1U2R3
,BU1F1R1E1U4H1L2G1D1F1R2,BR2U1BU
2E1U1H1L1G1:CS=8:GOTO16
4 IFH>249THENH=249
5 IFV<22THENV=22
6 IFV>185THENV=185
7 RETURN
8 FORX=5TO8:PCOPYX TOX-4:NEXTX:R
ETURN
9 IFPEEK(6528Ø)=126ORPEEK(6528Ø)
=254THENJ=1:SOUND2ØØ,1:RETURNELS
EJ=Ø:RETURN
1Ø FORX=4TO39STEP35:FORY=21TO19Ø
STEP34:LINE(X,Y)-(X+3Ø,Y+3Ø),PSE
T,B:NEXTY,X:RETURN
11 H=JOYSTK(Ø)*4:V=JOYSTK(1)*3:R
ETURN
12 DRAW"C"+STR$(C1):FORX=1TOLEN(
M$):A$=MID$(M$,X,1):Y=ASC(A$):IF
Y>=65ANDY<=9ØTHEN:Y=Y-65:GOTO15
13 IFY>=48ANDY<=57THENY=Y-22:GOT
O15
14 IFY=63THENY=36ELSE C=C+E:NEXT
X
15 DRAW"BM"+STR$(C)+","+STR$(D)+
O$(Y):C=C+E:NEXTX:RETURN
16 SCREEN1,SM:LINE(75,21)-(25Ø,1
Ø6),PSET,B:GOSUB1Ø:DRAW"BM55,48C
1U8L2D8R2U8L4H2U12R2D1ØU1ØR2D1ØU
1ØR2D1ØU1ØR2D1ØU1ØR2D12G2L2":M$=
"LINE":C=9:D=37:E=6:GOSUB12:LINE
(9,44)-(29,44),PSET
17 M$="CLR":C=9:D=72:E=8:GOSUB12
:M$="DRAW":C=8:D=132:E=6:GOSUB12
:M$="SAVE":C=44:D=132:GOSUB12:M$
="ABC":C=44:D=73:E=8:GOSUB12
18 LINE(75,2)-(25Ø,18),PSET,B:DI
MCC(Ø,23):PUT(5,22)-(33,5Ø),CC,N
OT:CIRCLE(54,1Ø4),1Ø:M$="FAST":E
=7:C=42:D=17Ø:GOSUB12:M$="MODE":
C=42:D=18Ø:GOSUB12
19 DRAW"BM46,135C1R16D16L16U16":
DRAW"BM11,135R16D16L16U16":DRAW"
BM4,2D16R65U16L65":DRAW"BM11,1ØØ
F12G4H12E12F12G8":POKE178,1:PAIN
T(11,96),,1:POKE178,2:PAINT(12,1
Ø5),,1
2Ø M$="NEXT":C=8:D=17Ø:E=6:GOSUB
12:M$="MENU":C=8:D=18Ø:GOSUB12:G
```

Listing continued

See List of Advertisers on page 89

Telewriter-64™

the Color Computer Word Processor

- **3 display formats: 51/64/85 columns × 24 lines**
- **True lower case characters**
- **User-friendly full-screen editor**
- **Right justification**
- **Easy hyphenation**
- **Drives any printer**
- **Embedded format and control codes**
- **Runs in 16K, 32K, or 64K**
- **Menu-driven disk and cassette I/O**
- **No hardware modifications required**

THE ORIGINAL

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with *true lower case characters*. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

...one of the best programs for the Color Computer I have seen...
— Color Computer News, Jan. 1982

TELEWRITER-64

But now we've added more power to Telewriter. Not just bells and whistles, but major features that give you total control over your writing. We call this new supercharged version Telewriter-64. For two reasons.

64K COMPATIBLE

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEX to put all your 64K to work immediately.

64 COLUMNS (AND 85!)

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24!! Both high density modes provide all the standard Telewriter editing capabilities, and you can switch instantly to any of the 3 formats with a single control key command.

The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, *all on the screen at one time*. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

RIGHT JUSTIFICATION & HYPHENATION

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple.

Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

FEATURES & SPECIFICATIONS:

Printing and formatting: Drives any printer (LPVII/VIII, DMP-100/200, Epson, Okidata, Centronics, NEC, C. Itoh, Smith-Corona, Terminet, etc).

Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dot-graphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, change page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

File and I/O Features: ASCII format files — create and edit BASIC, Assembly, Pascal, and C programs, Smart Terminal files (for uploading or downloading), even text files from other word processors. Compatible with spelling checkers (like Spell 'n Fix).

Cassette verify command for sure saves. Cassette auto-retry means you type a load command only once no matter where you are in the tape.

Read in, save, partial save, and append files with disk and/or cassette. For disk: print directory with free space to screen or printer, kill and rename files, set default drive. Easily customized to the number of drives in the system.

Editing features: Fast, full-screen editor with wordwrap, block copy, block move, block delete, line delete, global search and replace (or delete), wild card search, fast auto-repeat cursor, fast scrolling, cursor up, down, right, left, begin line, end line, top of text, bottom of text; page forward, page backward, align text, tabs, choice of buff or green background, complete error protection, line counter, word counter, space left, current file name, default drive in effect, set line length on screen.

Insert or delete text anywhere on the screen without changing "modes." This fast "free-form" editor provides maximum ease of use. Everything you do appears immediately on the screen in front of you. Commands require only a single key or a single key plus CLEAR.

...truly a state of the art word processor... outstanding in every respect.
— The RAINBOW, Jan. 1982

PROFESSIONAL WORD PROCESSING

You can no longer afford to be without the power and efficiency word processing brings to everything you write. The TRS-80 Color Computer is the lowest priced micro with the capability for serious word processing. And only Telewriter-64 fully unleashes that capability.

Telewriter-64 costs $49.95 on cassette, $59.95 on disk, and comes complete with over 70 pages of well-written documentation. (The step-by-step tutorial will have your writing with Telewriter-64 in a matter of minutes.)

To order, send check or money order to:

Cognitec
704 N. Nob St.
Del Mar, CA 92014

Or check your local software store. If you have questions, or would like to order by Visa or Mastercard, call us at (619) 755-1258 (weekdays, 8AM-4PM PST). Dealer inquiries invited.

(Add $2 for shipping. Californians add 6½% state tax. Allow 2 weeks for personal checks. Send self-addressed stamped envelope for Telewriter reviews from CCN, RAINBOW, 80-Micro, 80-U.S. Telewriter owners: send SASE or call for information on upgrading to Telewriter-64. Telewriter-compatible spelling checker (Spell 'n Fix) and Smart Terminal program (Colorcom/E) also available. Call or write for more information.)

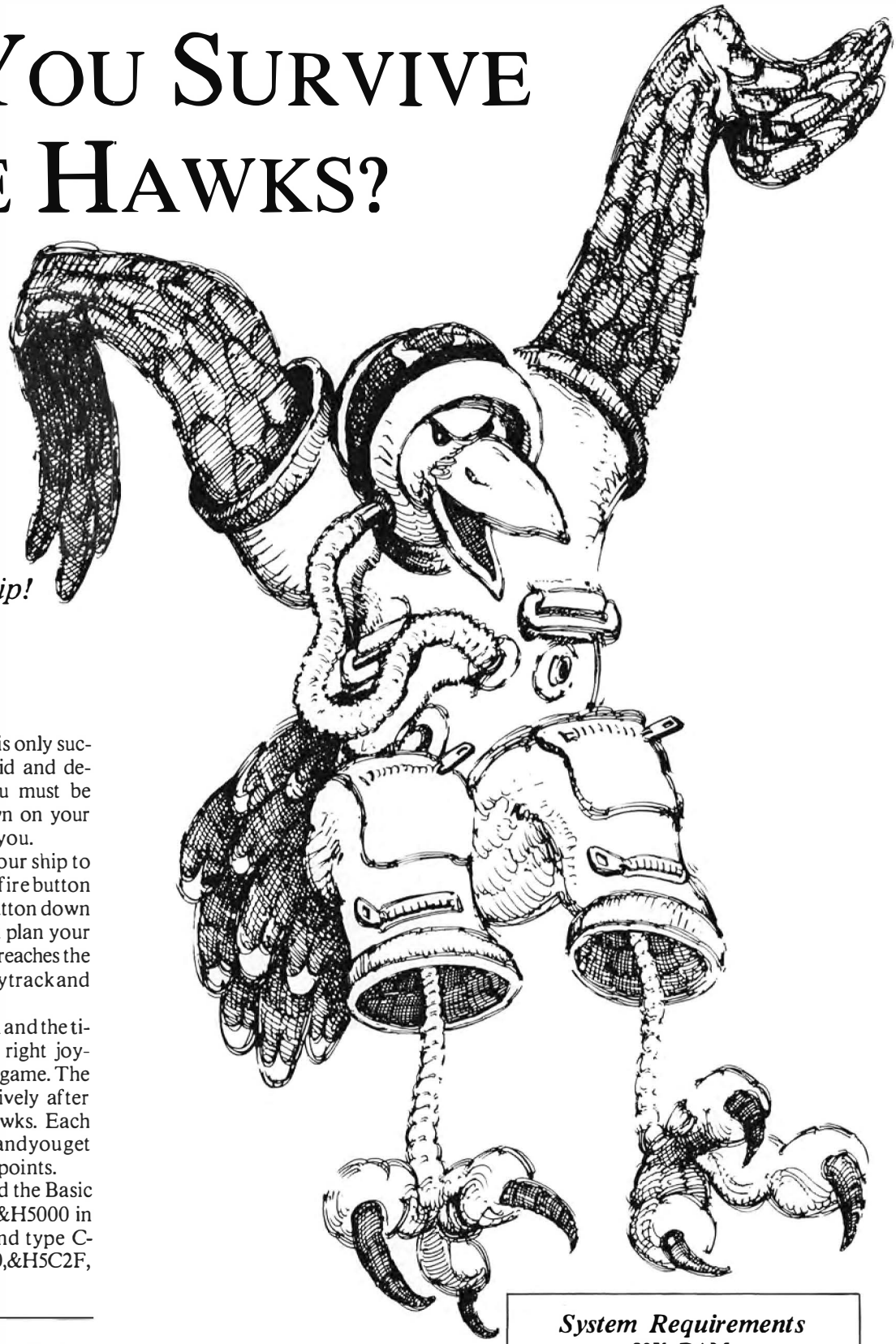
Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is a trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.

```
ET(4,Ø)-(69,191),M1,G:PUT(4,Ø)-(
69,191),M2,PSET:GOSUBlØ:FORX=19T
O54STEP35:CIRCLE(X,36),4
21 DRAW"BM"+STR$(X)+",65L8D2R2U2
R14D2L2U2":DRAW"BM"+STR$(X)+",6Ø
L12D12R24U12L12":DRAW"BM"+STR$(X
)+",3ØL1U6R2D6L1":PSET(X+6,32):N
EXTX:M$="SAVE":E=7:C=42:D=49:GOS
UBl2:C=42:D=82:GOSUBl2:M$="LOAD"
:C=7:D=49:GOSUBl2:C=7:D=82:GOSUB
12
22 M$="OLD":C=9:D=17Ø:E=8:GOSUBl
2:M$="MENU":C=8:D=18Ø:E=6:GOSUBl
2:LINE(6,9Ø)-(34,118),PSET:LINE(
34,9Ø)-(6,118),PSET:PAINT(2Ø,93)
,1,1:PAINT(2Ø,114),1,1:LINE(4Ø,9
Ø)-(68,118),PSET
23 LINE(68,9Ø)-(4Ø,118),PSET:LIN
E(54,9Ø)-(54,118),PSET:LINE(4Ø,1
Ø4)-(68,1Ø4),PSET:PAINT(48,93),1
,1:PAINT(64,99),1,1:PAINT(6Ø,114
),1,1:PAINT(44,1Ø8),1,1
24 M$="DARK":E=7:C=7:D=134:GOSUB
12:M$="LITE":C=42:D=134:GOSUBl2:
M$="INK":C=1Ø:D=144:GOSUBl2:C=45
:D=144:GOSUBl2:PUT(4Ø,124)-(68,1
52),CC,NOT:M$="END":C=45:D=174:G
OSUBl2:GET(4,Ø)-(69,191),M2,G:PU
T(4,Ø)-(69,191),M1,PSET
25 E=6:M$="PAINT KING BY JOEL DO
UCET":C=9Ø:D=13:GOSUBl2
26 FORX=1TO4:PCOPYX TOX+4:NEXTX:
SCREEN1,SM:SOUND2ØØ,1
27 GOSUBll
28 IFH<76THEN GOSUB57
29 GOSUB4
3Ø PSET(H,V,C1):FORX=1TO25:NEXTX
:PSET(H,V,C2)
31 GOSUB9:IFJ=1THENFORX=1TO25:NE
XTX:H1=H:V1=V:GOTO33
32 GOTO27
33 GOSUBll
34 IFH<76THEN GOSUB57
35 GOSUB4
36 COLORC1,C2:LINE(H1,V1)-(H,V),
PSET:GOSUB8
37 GOSUB9:IFJ=1THENFORX=1TO25:NE
XTX:PMODE4,5:COLORC1,C2:LINE(H1,
V1)-(H,V),PSET:GOSUB8:PMODE4,1:G
OTO27
38 GOTO33
39 GOSUBll
4Ø IFH<76THEN GOSUB57
41 IFH>22ØTHENH=22Ø
42 IFV<48THENV=48
43 IFV>159THENV=159
44 PSET(H,V,C1):FORX=1TO25:NEXTX
:PSET(H,V,C2)
45 GOSUB9:IFJ=1AND H>1ØØTHEN FOR
 X=1TO5Ø:NEXTX:GOTO46ELSE39
46 Y=(JOYSTK(Ø)/3)+4:CIRCLE(H,V)
,Y,C1:FORX=1TO25:NEXTX:CIRCLE(H,
V),Y,C2
47 GOSUB9:IFJ=1THENPMODE4,5:CIRC
LE(H,V),Y,C1:GOSUB8:FORX=1TO5Ø:N
EXTX:PMODE4,1:SCREEN1,SM:GOSUB57
:GOTO39ELSE46
48 GOSUBll
49 IFH<76THENGOSUB57
5Ø IFH>246THENH=246
51 IFV<22THENV=22
52 IFV>183THENV=183
53 COLOR1,Ø:LINE(H,V)-(H+3,V+2),
PSET,BF:GOSUB8
54 LINE(H,V)-(H+3,V+2),PRESET,BF
:GOSUB8
55 GOSUB9:IFJ=1THENPMODE4,5:LINE
(H,V)-(H+3,V+2),PRESET,BF:PMODE4
,1:SCREEN1,SM
56 GOTO48
57 GOSUB59:IFRE=1THENRETURN
58 GOSUB9:IFJ=1THENGOTO65ELSE57
59 GOSUBll
6Ø IFH>72THENCOLORC1,C2:RE=1:RET
URNELSERE=Ø
61 IFH<4THENH=4
62 IFV<6THENV=6
63 IFV>186THENV=186
64 PMODE4,1:SCREEN1,SM:DRAW"BM"+
STR$(H)+","+STR$(V)+"C1U3D6U3L3R
6":FORX=1TO25:NEXTX:DRAW"BM"+STR
$(H)+","+STR$(V)+"CØU3D6U3L3R6":
GOSUB8:RETURN
65 IFH>=8ANDH<=28ANDV>=24ANDV<=4
8THENPMODE4,5:PUT(5,22)-(33,5Ø),
CC,NOT:GOSUB99:PO=1:GOSUB8:PMODE
4,1:GOSUB27
66 IFH>=44ANDH<=64ANDV>=9ØANDV<=
117THENPMODE4,5:PUT(4Ø,9Ø)-(68,1
18),CC,NOT:GOSUB99:PO=4:GOSUB8:P
MODE4,1:GOSUB39
67 IFH>=44ANDH<=64ANDV>=159ANDV<
=183THENPMODE4,5:PUT(4Ø,158)-(68
,186),CC,NOT:GOSUB8:IFSU=ØTHENPO
KE65495,Ø:SU=1:PMODE4,1ELSEPOKE6
5494,Ø:SU=Ø:PMODE4,1
68 IFH>=44ANDH<=64ANDV>=24ANDV<=
48THENPMODE4,5:GOSUB99:PO=2:PUT(
4Ø,22)-(68,5Ø),CC,NOT:CC=Ø:GOSUB
89
69 IFH>=8ANDH<=32ANDV>=9ØANDV<=1
17THENPMODE4,5:PUT(5,9Ø)-(33,118
),CC,NOT:GOSUB99:PO=5:GOSUB8:PMO
DE4,1:GOSUB48
7Ø IFH>=8ANDH<=32ANDV>=57ANDV<=8
1THENGOSUB98
71 IFH>=44ANDH<=64ANDV>=57ANDV<=
81THEN72ELSE85
72 A$=INKEY$:PMODE4,5:PUT(4Ø,56)
-(68,84),CC,NOT:GOSUB99:PO=3:GOS
UB8:SCREEN1,SM
73 GOSUBll
74 IFH<8ØTHENGOSUB57
75 IFH>244THENH=244
76 IFV<33THENV=33
77 IFV>185THENV=185
78 PSET(H,V,C1):FORX=1TO25:NEXTX
:PSET(H,V,C2)
79 GOSUB9:IFJ=1THENFORX=1TO5ØØ:N
EXTX:GOSUB81ELSE73
8Ø GOTO73
81 TH=H:A$=INKEY$
82 M$=INKEY$:GOSUB9:IFJ=1ORTH>24
4THENFORX=1TO5Ø:NEXTX:RETURN
83 IF(M$>="A"ANDM$<="Z")OR(M$>="
Ø"ANDM$<="9")THENSOUND2ØØ,1:C=TH
:D=V-2:PMODE4,5:SCREEN1,SM:GOSUB
12:GOSUB8:PMODE4,1:SCREEN1,SM:TH
=TH+7
84 GOTO82
85 IFH>=8ANDH<=32ANDV>=126ANDV<=
15ØTHENPMODE4,5:SCREEN1,SM:PUT(5
,124)-(33,152),CC,NOT:PUT(76,22)
-(249,185),IS,PSET:PUT(5,124)-(3
3,152),CC,NOT:GOSUB8::PMODE4,1:S
CREEN1,SM
86 IFH>=44ANDH<=64ANDV>=126ANDV<
=15ØTHENPMODE4,5:SCREEN1,SM:PUT(
4Ø,124)-(68,152),CC,NOT:GET(76,2
2)-(249,185),IS,G:PUT(4Ø,124)-(6
8,152),CC,NOT:GOSUB8:PMODE4,1:SC
REEN1,SM
87 IFH>=8ANDH<=32ANDV>=159ANDV<=
183THENPMODE4,5:SCREEN1,SM:GOSUB
1Ø5
88 GOTO57
89 PMODE4,5:SCREEN1,SM:PUT(5,3)-
(67,17),CC,PSET
9Ø CC=CC+1:IFCC=256THENCC=1
91 POKE178,CC:PAINT(5,3),,1:GOSU
B8::PMODE4,1:SCREEN1,SM:FORX=1TO
25Ø:NEXTX:GOSUB9:IFJ=1THEN89
92 GOSUBll:H=H+1:V=V+1
93 IFH<76THENGOSUB57
94 GOSUB4
95 PSET(H,V):FORX=1TO25:NEXTX:PR
ESET(H,V)
96 GOSUB9:IFJ=1THENFORX=1TO25:NE
XTX:PMODE4,5:SCREEN1,SM:POKE178,
CC:PAINT(H,V),,1:GOSUB8:PMODE4,1
:SCREEN1,SM:GOTO92
97 GOTO92
98 PMODE4,5:SCREEN1,SM:PUT(5,56)
-(33,84),CC,NOT:COLORØ,1:FORX=76
TO249:LINE(X,22)-(X,185),PSET:NE
XTX:PUT(5,56)-(33,84),CC,NOT:GOS
UB8:PMODE4,1:SCREEN1,SM:RETURN
99 IFPO=1THENPUT(5,22)-(33,5Ø),C
C,NOTELSEIFPO=2THENPUT(4Ø,22)-(6
8,5Ø),CC,NOTELSEIFPO=3THENPUT(4Ø
,56)-(68,84),CC,NOTELSEIFPO=4THE
NPUT(4Ø,9Ø)-(68,118),CC,NOTELSEP
UT(5,9Ø)-(33,118),CC,NOT
1Ø4 GOSUB8:RETURN
1Ø5 GET(4,Ø)-(69,191),M1,G:PUT(4
,158)-(33,186),CC,NOT:PUT(4,Ø)-(
69,191),M2,PSET:GOSUB8:PMODE4,1:
SCREEN1,SM
1Ø6 GOSUB59
1Ø7 GOSUB9:IFJ=1THEN1Ø8ELSE1Ø6
1Ø8 IFH>=8ANDH<=32ANDV>=159ANDV<
=183THENPMODE4,5:SCREEN1,SM:GET(
4,Ø)-(69,191),M2,G:PUT(4,158)-(3
3,186),CC,NOT:PUT(4,Ø)-(69,191),
M1,PSET:GOSUB8:PMODE4,1:SCREEN1,
SM:RETURN
1Ø9 IFH>=44ANDH<=64ANDV>=9ØANDV<
=117THENPMODE4,5:SCREEN1,SM:PUT(
4Ø,9Ø)-(68,118),CC,NOT:GOSUB8:PM
ODE4,1:IFSM=ØTHENSM=1:SCREEN1,SM
 ELSESM=Ø:SCREEN1,SM
11Ø IFH>=8ANDH<=32ANDV>=9ØANDV<=
117THENPMODE4,5:SCREEN1,SM:PUT(5
,9Ø)-(33,118),CC,NOT:PUT(76,22)-
(249,185),IS,NOT:GOSUB8:PMODE4,1
:SCREEN1,SM
111 IFH>=8ANDH<=32ANDV>=126ANDV<
=15ØTHENIFC1=1THENPMODE4,5:PUT(4
Ø,124)-(68,152),CC,NOT:PUT(5,124
)-(33,152),CC,NOT:C1=Ø:C2=1:GOSU
B8:PMODE4,1
112 IFH>=44ANDH<=64ANDV>=126ANDV
<=15ØTHENIFC1=ØTHENPMODE4,5:PUT(
5,124)-(33,152),CC,NOT:PUT(4Ø,12
4)-(68,152),CC,NOT:C1=1:C2=Ø:GOS
UB8:PMODE4,1
113 IFH>=44ANDH<=64ANDV>=24ANDV<
=48THENPUT(4Ø,22)-(68,5Ø),CC,NOT
:GOSUBl19:IFNS<>1THENGOSUBl21:PM
ODE4,5:SAVEMTI$,PEEK(&HBA)*256,P
EEK(&HB7)*256-1,413:PMODE4,1:GOS
UB8ELSEGOSUB8
114 IFH>=44ANDH<=64ANDV>=57ANDV<
=81THENPUT(4Ø,56)-(68,84),CC,NOT
:GOSUBl19:IFNS<>1THENGOSUBl21:PM
ODE4,5:CSAVEMTI$,PEEK(&HBA)*256,
PEEK(&HB7)*256-1,413:PMODE4,1:GO
SUB8ELSEGOSUB8
115 IFH>=8ANDH<=28ANDV>=24ANDV<=
48THENGET(4,Ø)-(69,191),M2,G:PUT
(5,22)-(33,5Ø),CC,NOT:GOSUB119:I
FNS<>1THENGOSUB121:PMODE4,5:SCRE
EN1,SM:LOADMTI$:PUT(4,Ø)-(69,191
),M2,PSET:GOSUB8:PMODE4,1:SCREEN
1,SM ELSEGOSUB8
116 IFH>=8ANDH<=28ANDV>=57ANDV<=
81THENGET(4,Ø)-(69,191),M2,G:PUT
(5,56)-(33,84),CC,NOT:GOSUB119:I
FNS<>1THENPMODE4,5:SCREEN1,SM:CL
OADM:PUT(4,Ø)-(69,191),M2,PSET:G
OSUB8:PMODE4,1:SCREEN1,SM ELSEGO
SUB8
117 IFH>=44ANDH<=64ANDV>=159ANDV
<=183THENPUT(4Ø,158)-(68,186),CC
,NOT:GOSUBl19:IFNS=ØTHENEND
118 GOTO1Ø6
119 GOSUBl24:TC=C1:C1=1:A$=INKEY
$:M$="ARE YOU SURE?":E=7:C=116:D
=13:GOSUBl2:C1=TC
12Ø A$=INKEY$:IFA$=""THEN12ØELSE
SOUND2ØØ,1:IFA$="N"THENGOSUB8:NS
=1:RETURNELSENS=Ø:RETURN
121 GOSUBl24:TC=C1:C1=1:E=7:C=8Ø
:D=13:M$="ENTER FILENAME":GOSUBl
2:TI$=""
122 FORQ=188TO237STEP7
123 A$=INKEY$:IFA$=""THEN123ELSE
SOUND2ØØ,1:TI$=TI$+A$:M$=A$:C=Q:
GOSUBl2:NEXTQ:C1=TC:RETURN
124 PUT(9Ø,3)-(152,17),CC,PSET:P
UT(153,3)-(215,17),CC,PSET:PUT(1
86,3)-(248,17),CC,PSET:RETURN
```

END

This program is available on our Instant CoCo cassette.
See the Instant CoCo ad elsewhere in this issue.

CAN YOU SURVIVE SPACE HAWKS?



If a hawk swoops down on you, kill it before it destroys your ship!

Your trip through space is only successful if you can avoid and destroy the deadly hawks. You must be alert: If a hawk swoops down on your ship, kill it before it destroys you.

Use the joystick to move your ship to the left or right, and press the fire button to shoot. You can hold the button down for continuous rapid fire, but plan your aim carefully. Any hawk that reaches the bottom of the screen will surely track and destroy you.

After you load the program and the title screen appears, press the right joystick's fire button to begin the game. The difficulty increases progressively after you destroy each wave of hawks. Each dead hawk is worth 50 points, and you get a free ship after every 10,000 points.

To create a binary file, load the Basic driver and delete the EXEC&H5000 in line 40. Run the program and type CSAVEM "HAWK",&H5000,&H5C2F,&H5000.■

Address correspondence to Rodger Smith, 3775 Gilham Road, Eugene, OR 97401.

Illustration by Peter Bono

System Requirements
32K RAM
Extended Color Basic

```
10 'SPACE HAWK
20 'BY RODGER SMITH 1984
30 A=&H5000  'START ADDR
40 READ D:IF D=999THENEXEC&H5000
50 POKE A,D:A=A+1:GOTO 40
60 DATA 16,206,79,252,26,80,127,
255,64,127,255,222,252,1,18,253,
89,215,253,89,217,183,255,192,18
3,255,195,183,255,197,183,255,19
9,183,255,200,134,248,183,255
70 DATA 34,134,53,183,255,3,23,0
,151,23,0,215,23,10,38,23,10,17,
23,6,45,23,0,166,28,239,23,0,252
,23,6,69,198,1,245,255,0,38,243,
150
80 DATA 1,39,3,23,6,55,26,80,23,
2,185,23,0,106,23,0,170,23,0,130
,23,9,246,23,9,225,10,21,23,9,12
4,12,21,28,239,252,1,18,147,15
90 DATA 16,131,0,7,37,8,252,1,18
,221,15,23,2,199,252,1,18,147,22
,16,131,0,4,37,8,252,1,18,221,22
,23,1,54,23,0,165,23,1,199,141
100 DATA 2,32,208,23,0,242,23,1,
96,23,3,174,23,1,237,134,1,151,0
,19,150,19,39,3,23,2,97,23,0,244
,23,1,122,23,3,227,23,1,248,57
110 DATA 142,81,25,191,1,13,198,
1,215,14,204,0,0,253,91,102,253,
91,104,253,91,106,253,91,100,134
,4,151,21,57,204,0,0,253,1,18,22
1,15,221,22
120 DATA 151,0,151,1,151,7,151,1
2,151,20,134,62,151,4,151,6,134,
170,151,5,23,0,113,23,3,245,57,1
42,2,0,204,0,0,237,129,140,50,0,
37,249
130 DATA 57,124,1,19,38,3,124,1,
18,150,0,39,24,15,0,150,1,39,10,
15,1,183,255,202,183,255,204,32,
8,12,1,183,255,203,183,255,205,1
82,255,2
140 DATA 59,198,20,142,87,32,106
,3,39,6,48,6,90,38,247,57,141,21
,16,174,132,49,168,32,16,140,26,
0,37,4,49,169,233,128,16,175,132
,32,227,134
150 DATA 4,193,6,37,8,134,3,193,
12,37,2,134,2,167,3,57,198,20,14
2,87,32,16,142,86,248,238,161,23
9,132,239,4,31,152,132,3,38,1,76
,167,2
160 DATA 141,213,48,6,90,38,234,
57,198,20,142,87,32,16,174,132,1
50,1,38,4,49,169,24,0,166,2,167,
164,48,6,90,38,236,57,198,20,142
,87,32,79
170 DATA 16,174,4,238,132,239,4,
13,1,38,4,49,169,24,0,167,164,48
,6,90,38,234,57,173,159,160,10,1
27,255,32,182,1,90,72,129,8,37,1
7,129,118
180 DATA 34,28,129,56,37,5,129,7
2,34,16,57,145,4,36,251,214,4,19
2,2,43,245,39,243,215,4,57,145,4
,35,236,214,4,203,2,193,124,36,2
28,215,4
190 DATA 57,142,2,0,150,1,38,4,4
8,137,24,0,191,88,211,10,7,42,4,
134,10,151,7,150,7,129,5,34,6,16
,142,89,117,32,4,16,142,89,137,2
04
200 DATA 1,10,253,89,105,220,4,2
3,6,138,57,150,6,214,4,215,6,214
,5,142,2,0,68,68,30,137,58,198,3
2,61,48,139,150,1,38,4,48,137,24
,0
210 DATA 206,0,0,198,10,239,132,
48,136,32,90,38,248,57,150,12,38
,32,150,11,38,7,198,1,245,255,0,
39,1,57,150,4,151,8,150,5,128,5,
151,9
220 DATA 151,10,15,11,12,12,23,0
,166,57,150,9,128,5,129,12,34,5,
15,12,12,11,57,151,9,22,3,90,150
,12,38,1,57,142,2,0,150,1,38,4
230 DATA 48,137,24,0,191,88,211,
204,1,5,253,89,105,220,8,16,142,
89,107,23,6,6,57,150,12,38,7,150
,11,38,1,57,15,11,214,10,150,9,1
51,10
240 DATA 150,8,142,2,0,68,68,30,
137,58,198,32,61,48,139,150,1,38
,4,48,137,24,0,204,0,0,237,132,2
37,136,32,237,136,64,237,136,96,
237,137,0
250 DATA 128,57,134,252,127,255,
32,183,255,32,90,38,247,57,48,31
,38,252,57,142,0,0,141,246,90,38
,248,57,198,1,245,255,0,39,251,5
7,141,36,198,25
260 DATA 52,4,141,214,142,0,4,14
1,221,53,4,90,38,242,57,141,17,1
98,65,52,4,141,195,142,0,2,141,2
02,53,4,90,38,242,57,182,255,35,
132,247,138
270 DATA 8,183,255,35,57,15,13,1
98,25,215,2,142,87,152,166,8,38,
23,230,4,193,100,38,4,198,3,231,
4,48,12,10,2,38,236,150,13,16,39
,2,7
280 DATA 57,12,13,106,10,38,19,2
30,11,231,10,230,4,193,100,39,9,
93,38,4,108,4,32,2,111,4,106,6,3
8,214,214,20,38,14,134,19,167,8,
198,1
290 DATA 231,6,12,20,198,25,231,
5,129,3,16,39,0,92,129,4,16,39,0
,110,129,5,16,36,0,118,230,7,231
,6,108,1,108,1,230,1,209,5,37,18

300 DATA 230,132,209,4,34,4,198,
4,32,2,198,3,231,8,31,152,32,206
,230,5,129,1,38,6,16,142,86,234,
32,4,16,142,86,220,166,132,171,1
65,167,132
310 DATA 92,193,13,35,13,95,166,
8,129,1,38,3,76,32,1,74,167,8,23
1,5,23,1,140,22,255,98,166,132,1
28,2,42,6,134,4,167,8,32,12,167,
132
320 DATA 134,1,167,6,23,1,116,22
,255,74,166,132,139,2,129,121,37
,236,134,3,167,8,32,218,38,4,134
,19,167,8,106,8,129,12,34,30,166
,132,139,2
330 DATA 129,121,34,2,167,132,16
6,1,139,2,167,1,106,5,38,2,15,20
,145,5,16,34,255,112,32,190,166,
132,128,2,42,228,32,228,15,19,14
2,2,0,150
340 DATA 1,38,4,48,137,24,0,191,
88,211,198,25,215,2,142,87,152,1
66,8,38,21,16,142,89,219,166,4,1
29,100,38,4,12,19,32,19,48,12,10
,2,38
350 DATA 232,57,16,142,89,157,16
6,4,38,4,16,142,89,173,204,2,4,2
53,89,105,236,132,52,16,23,4,33,
53,16,32,220,198,25,215,2,16,142
,87,152,166
360 DATA 40,38,22,166,36,129,3,3
7,9,129,100,39,12,74,167,36,32,7
,49,44,10,2,38,231,57,236,34,238
,164,239,34,142,2,0,68,68,30,137
,58,198
370 DATA 32,61,48,139,150,1,38,4
,48,137,24,0,206,0,0,239,132,239
,1,239,136,32,239,136,33,239,136
,64,239,136,65,239,136,96,239,13
6,97,32,195,141
380 DATA 105,214,14,134,5,61,77,
38,4,193,25,35,2,198,25,215,2,16
,142,86,170,214,14,90,193,15,37,
2,198,14,206,86,155,230,197,247,
83,157,134,5
390 DATA 151,17,15,18,142,87,152
,236,161,237,132,237,2,111,4,111
,5,198,4,231,7,150,17,167,6,150,
18,38,4,134,1,32,2,134,2,167,8,1
0,17,38
400 DATA 10,134,5,151,17,150,18,

136,1,151,18,111,9,198,2,231,10,
231,11,48,12,10,2,38,198,57,198,
25,142,87,152,111,8,48,12,90,38,
249,57,23
410 DATA 0,232,26,80,16,206,79,2
52,150,14,129,20,34,2,12,14,126,
80,94,166,132,144,4,36,7,64,129,
6,35,6,32,25,129,3,34,21,166,1,1
44,5
420 DATA 36,9,64,129,3,16,35,0,1
36,32,6,129,9,16,35,0,128,150,12
,38,1,57,166,132,144,8,36,6,64,1
29,7,35,6,57,129,3,35,1,57,166
430 DATA 1,144,9,36,6,64,129,4,3
5,6,57,129,5,35,1,57,18,134,100,
167,4,166,8,129,5,37,2,15,20,111
,8,15,12,12,11,52,16,142,0,50
440 DATA 23,4,161,53,16,57,142,8
7,152,198,25,215,2,166,8,38,7,48
,12,10,2,38,246,57,166,132,144,8
,36,7,64,129,7,35,8,32,236,129,3
,35
450 DATA 2,32,230,166,1,144,9,36
,7,64,129,4,35,8,32,217,129,5,35
,2,32,211,126,85,217,16,206,79,2
52,141,43,26,80,198,15,52,4,23,2
52,220
460 DATA 23,252,236,142,0,200,23
,252,189,53,4,90,38,237,10,21,16
,38,250,10,23,4,136,198,2,23,252
,175,23,252,181,126,80,49,150,1,
39,3,23,250
470 DATA 58,57,142,10,39,16,142,
91,114,198,19,134,10,52,20,230,1
60,231,132,231,137,24,0,48,136,3
2,74,38,242,53,20,48,1,90,38,231
,57,23,251,8
480 DATA 141,216,134,1,151,0,19,
23,251,24,57,15,20,25,30,45,43,4
1,39,37,35,33,31,29,27,25,38,16,
50,16,62,16,74,16,86,16,38,28,50
,28
490 DATA 62,28,74,28,86,28,38,40
,50,40,62,40,74,40,86,40,38,52,5
0,52,62,52,74,52,86,52,38,64,50,
64,62,64,74,64,86,64,6,5,4,3
500 DATA 2,1,0,0,255,254,253,252
,251,250,250,251,252,253,254,255
,0,0,1,2,3,4,5,6,16,73,4,44,5,40
,22,19,7,28,18,235,9,38,24,138
510 DATA 12,14,21,30,3,195,16,21
8,17,199,8,65,20,55,13,185,5,182
,22,194,9,209,25,123,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0
520 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
530 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
540 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
550 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
560 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
570 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
580 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
590 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
600 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
610 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
620 DATA 0,0,0,0,253,89,103,182,
89,106,183,89,100,182,89,103,68,
68,142,2,0,30,137,58,198,32,61,4
8,139,246,89,103,196,3,39,90,247
,89,99,31
630 DATA 19,190,89,98,255,89,101
,95,166,33,70,86,70,86,48,31,38,
248,183,89,29,247,89,31,166,161,
190,89,98,95,192,1,70,86,70,86,4
8,31,38,248
640 DATA 183,89,25,247,89,27,236
,196,132,0,196,0,138,0,202,0,237
106,38,194,182,89,100,183,89,106
,254,89,101,51,65
650 DATA 122,89,105,38,175,57,19
1,89,101,166,132,164,160,170,160
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,167,132,48,136,32,122,89,106,38
,240,190,89,101,48,1,182,89,100,
183,89,106,122,89,105,38
660 DATA 221,57,0,0,0,0,0,0,0,0,
0,195,24,195,24,195,24,195,24,19
5,24,195,24,195,60,195,60,0,126,
0,255,0,255,0,255,0,231,60,195,6
0
670 DATA 195,195,24,195,60,195,6
0,0,126,0,247,0,255,0,255,0,231,
60,195,60,66,195,20,192,53,12,81
,63,64,15,80,3,88,195,20,243,4,1
5,80,192
680 DATA 29,252,3,255,0,195,20,1
5,80,255,0,255,0,142,89,215,79,1
98,3,166,133,90,169,133,167,133,
90,42,249,198,3,108,133,38,3,90,
42,249,57,0
690 DATA 0,0,0,204,49,255,0,204,
19,63,192,207,48,255,0,207,16,24
3,12,127,91,98,141,50,13,21,39,4
5,142,2,9,16,142,89,137,198,9,16
6,132,164
700 DATA 160,170,160,167,132,167
,137,24,0,48,136,32,90,38,238,48
,137,254,225,124,91,98,182,91,98
,129,6,39,4,145,21,38,214,57,198
,6,142,2,9,79
710 DATA 167,136,32,167,136,64,1
67,136,96,167,137,0,128,167,137,
0,160,167,137,0,192,167,137,0,22
4,167,137,1,0,167,128,90,38,222,
57,206,2,61,198,6
720 DATA 247,91,98,134,85,183,90
,125,142,91,108,32,16,206,2,39,1
98,6,247,91,98,134,255,183,90,12
5,142,91,102,16,142,91,28,198,7,
166,128,61,49,171
730 DATA 198,7,166,160,132,85,16
7,196,167,201,24,0,51,200,32,90,
38,240,51,201,255,31,122,91,98,3
8,218,57,52,102,31,16,16,190,91,
100,49,171,16,191
740 DATA 91,100,16,140,39,16,37,
17,31,32,131,39,16,253,91,100,52
,16,23,255,54,53,16,12,21,95,16,
142,91,102,108,165,166,165,129,1
0,38,16,111,165
750 DATA 92,193,5,34,8,108,165,1
66,165,129,10,39,241,95,48,31,38
,223,141,129,53,102,57,142,91,10
7,16,142,91,113,198,6,166,132,38
,12,166,164,38,7
760 DATA 48,31,49,63,90,38,241,5
7,161,164,34,13,39,1,57,48,31,49
,63,166,132,90,38,240,57,252,91,
102,253,91,108,252,91,104,253,91
,110,252,91,106
770 DATA 253,91,112,57,12,51,51,
51,51,51,12,12,12,12,12,12,12,12
,12,51,3,12,48,48,63,12,51,3,12,
3,51,12,48,51,51,63,3,3,3,63
780 DATA 48,60,51,3,51,12,12,51,
48,60,51,51,12,63,3,3,3,3,3,3,12
,51,51,12,51,51,12,12,51,51,15,3
,51,12,0,0,0,0,0,0
790 DATA 0,0,0,0,0,0,0,0,0,0,85,
170,80,160,85,170,0,0,85,170,80,
160,0,0,80,160,80,160,80,160,85,
170,80,160,85,170,80,160,80,160
800 DATA 80,160,80,160,80,160,0,
0,0,0,85,170,80,160,85,170,80,16
0,80,160,80,160,80,160,80,160,80
,160,80,160,85,170,80,160,80,160
,80,160,85,170
810 DATA 80,160,0,0,0,0,0,0,80,1
60,85,170,80,160,85,170,80,160,8
5,170,80,160,0,0,0,0,0,0,80,160,
0,0,0,0,0,0,0,0,0,0
820 DATA 80,160,80,160,85,170,80
,160,80,160,80,160,80,160,80,160
,80,160,80,160,85,170,80,160,85,
170,80,160,80,160,80,160,80,160,
80,160,80,160,80,160
830 DATA 80,160,80,160,80,160,85
,170,80,160,80,160,80,160,80,160
,80,160,80,160,80,160,80,160,85,
170,81,160,80,160,20,40,80,160,6
4,128,64,160,80,40,999

END
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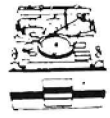

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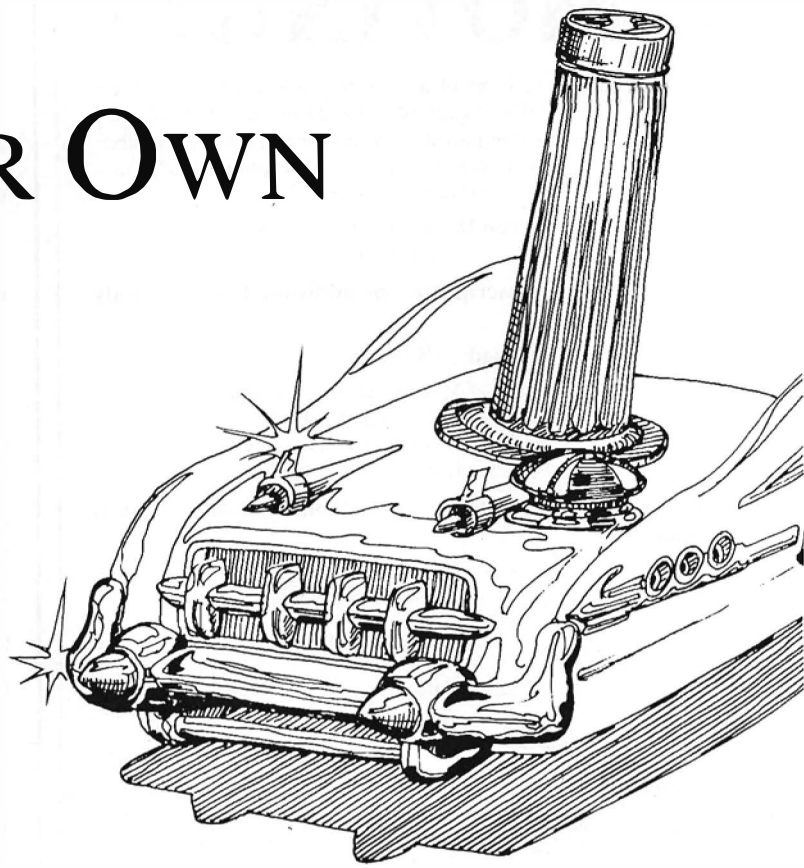
BY LALO MARTINEZ

BUILD YOUR OWN JOYSTICK



With this simple hardware project, you can build a joystick to equal any on the commercial market.

Build your own inexpensive alternative to commercial joysticks. The joystick featured here has a sturdy, professional-looking case, and it works as well, or better, than those selling for $50 or more. (You'll find a parts list in Table 1.)

To begin construction, remove the two Phillips-head screws from the Odyssey joystick and pull the top cover. You will see a white plastic plug connected to six wires. Carefully pull the plug and put the cable aside.

Push down the round, black plastic ring on the shaft and cut the retainer that holds it down. (You won't need this anymore.) Next, hit the joystick handle against a hard surface until a plastic retainer at the bottom breaks loose. Don't worry about being gentle-since you can't damage anything. Save this retainer.

Push the handle down. When you see the shaft coming out from the bottom, cut the white plastic bushing around the shaft and discard it.

Everything should now be loose. Pull the shaft using the black rings as a handle. Discard the big spring and the plastic rings. (You might need to pull a little harder if it does not come off the first time.)

You will see a board with a plastic sheet glued to it. This is the switch matrix used in the Odyssey 2 joystick. You will just be using the fire-button switch. (The fire-button has a stop point to prevent too much pressure from being applied on contact. There will always be a preset maximum of pressure on the contact regardless of how hard the button is pressed.

Place the Radio Shack pot on top of the board and position one control toward you and the other toward your right. Put the cover on and align the hole with the handle. Once they are aligned, lift the cover, making sure that the pots did not move, and mark the location. Now drill four holes, 1/8-inch in diameter, to coincide with holes on the Radio Shack pots. If you don't have a drill, use a sharp punch to make the holes.

To prepare cable to wire the pot, look for a metal clip near the plug around the brown insulator. Push it back four inches. (You might need to loosen it.) Peel off the brown insulator close to the clip.

Pull up the red, green, yellow, and orange wires off the plug, and cut the white wire two inches from the plug. Cut the orange wire at the clip and save it. (You will use it to make jumpers.) Do not disturb the black wire.

1 joystick from the Odyssey 2: part number 171572-1, available from any Magnavox parts department. ($10 each)
1 joystick pot: part number 271-1705, Radio Shack. ($4.95)
1 6-pin DIN plug: part number 17PP048, available from Mauser Electronics, 11433 Woodside Ave., Santee, CA 92017. 619-449-2222. ($.95)

Table 1. Parts List

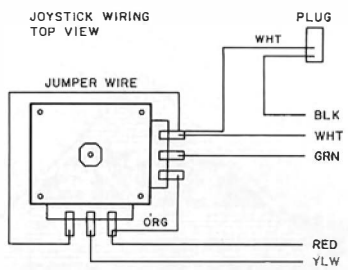


Fig. 1. Top View of Joystick Wiring

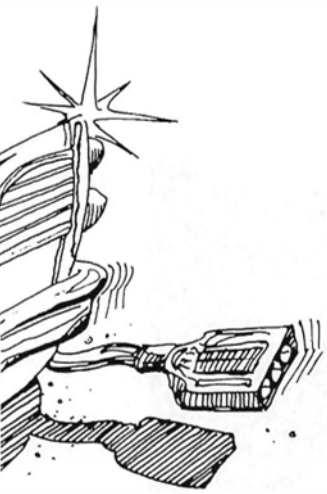


Illustration by Robert Dukette

Next, solder the wires to pot following the diagrams in Figs. 1 and 2. Mount the pot on the board with screws and insert the plug in its original place with the black wire towards the back of the joystick. Place the board back in the bottom half of the box. Secure the cover with the Phillips screws. Put the plastic retainer in the bottom cover using a strong glue such as Crazy Glue.

To wire the DIN plug, pull all wires off the plastic connectors and cut the orange wire close to the brown insulator. Solder wires to the DIN plug according to Figs. 1 and 2.

The entire project should take about 35 minutes.■

Address correspondence to Lalo Martinez, 190 Congress St., Jersey City, NJ 07307.

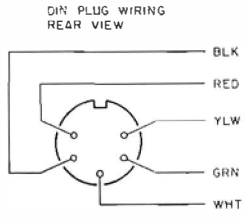


Fig. 2. DIN Plug Wiring (rear view)

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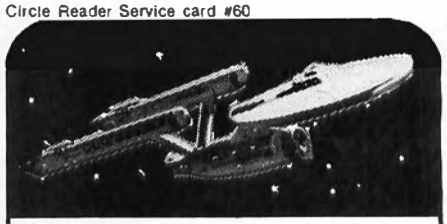

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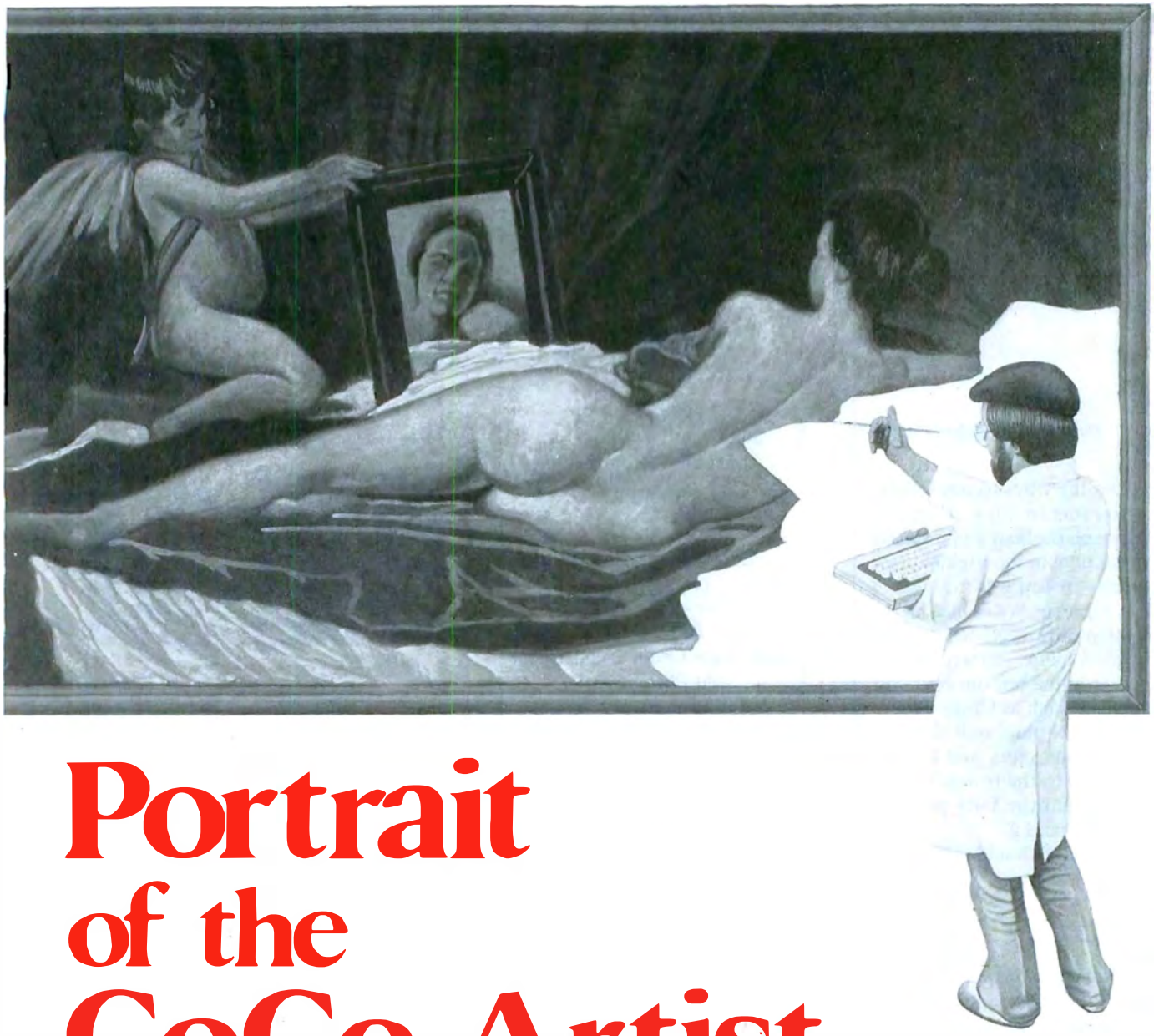
BY PAUL STATT

Professionals and amateurs alike are using their Color Computers for artistic expression. So can you.



Portrait of the CoCo Artist

Art has never been simple. Artists and philosophers from Aristotle to Tolstoy have been arguing for ages and the word isn't final. But beyond issues of aesthetics, utility, craftsmanship, and religion, the computer has made art in our time more complex than ever.

Illustration by Richard Cowdrey

Artwork by Ana Landa

Ana Landa spends her free time—when not driving her son to Boy Scout meetings and greeting sick children with laughter at the pediatrician's office where she works—drawing at the keyboard of a 64K CoCo. She claims she is not an artist. Eric White speaks softly and carefully about the future of art for artists—a time when he imagines all the visual material in a magazine like this one being produced on computer with a program being designed by a technically adept artist. Ron Kiyomura makes his money at the local Radio Shack store.

These CoCo artists are diverse. They prove that anyone can be an artist, or at least, as Ana Landa would say, that anyone can draw with the computer: "I don't really consider myself an artist since I have to erase so many times. I don't know how real artists do it, but at least I get pleasant pictures after a lot of trying." She sighs like someone who has worked carefully and slowly to build a sand castle. She takes pains. Ana is a friend of Marty Goodman, who markets the Graphicom software she uses. Goodman helped her get started in art, along with a few hours on CompuServe, where she saw the work of other amateurs. "But that's getting too expensive," she admits. Money brought Ana to the CoCo as well: "It was very inexpensive at the time I started. I began with a tape recorder and 16K of memory. I knew I could expand, and now I have ended up with 64K and a disk drive."

Ana has hopeful words for those who don't know the difference between 64K and Special K. A wealth of computer lore is not necessary for the creative person, she claims. "I didn't know anything about microprocessors. I'm really not at all interested in the computer itself. I play games on the computer. I have a lot of other software (in addition to Graphicom) that I don't really know what to do with. Her voice rises as she suddenly remembers "I did take some Fortran courses in high school." But she fades, "I did lousy."

Drawing is a hobby for Ana, one she could not practice without a computer. The machine makes it possible for the creative person—who could never stay between the lines in a coloring book—to draw. Her advice to other beginners is not to study the masters or to draw while standing on their heads, but just "to stick with it. It opens a lot of future to a person who really likes art.

"You should know a little bit of drawing. But no skill is necessary—only a lot of patience. With (Graphicom's) stamps and erase command, you can save the picture and do it over and over again, move it around, and put it into different positions until it looks right to your eye. That's not easy when you're drawing."

Ana is getting better, she thinks. She says that when she first began, her work was "primitive." But lately she notes the improvement of added background. "My work is very abstract. I use a lot of lines. I see others using a lot of shading and shadow, but I don't. Maybe it's just a lack of knowledge."

Ana's preference is for abstract modern art. She especially enjoys, as so many computer people do, the geometrical precision and whimsy of M.C. Escher.

Last fall she sold some Halloween pictures to a local exposition. When told that the sale of her paintings ended her status as an amateur, she laughs and replies, "Is that all it takes?" But she's still enjoying a hobby.

In assessing her skill, Ana maintains, "I've always liked drawing, but I've never done much because I wasn't any good. Graphicom makes it easy."

"The real mark of a professional," according to Eric White, "is not how good he (or she) is at the actual rendering, it's how good he covers his mistakes." Eric studied visual communications at the Art Institute of Pittsburg. He works as a commercial artist for a graphics shop in Florida. His CoCo is no hobby. But the very thing that makes Ana Landa doubt that she is a true artist—erasing—is what he claims is the sign of the professional.

"In normal artwork, say airbrush or line work or whatever, whenever you're doing your stuff and you mess up—you draw the line too far or you spray over something you shouldn't have—it's a problem. But if you're good, even if you make a mistake, you can fix it and it won't look like a mistake has ever been made. Everbody makes mistakes; it's how good you fix them."

The lure of the computer is perfection. Computer art may compromise precision or clarity but in favor of absolute perfection of form. On a computer, mistakes are nonexistent. "It's as if they never happened, says Eric. "Your printout or screen slides look perfect, and nobody in his right mind could tell if you once drew a big X on the middle of the screen—you cannot tell. When you're finished, it looks like you did it right the first time."

The first time is seldom the last. Eric has "updated versions" (Mona Lisa 1.2?) of all his pictures. When he started using the CoCo for his art two years ago, the Radio Shack *X-Pad* was not the tool that Eric has since programmed it to be. Eric wrote the software he uses. As he improves his programs, he goes back to work done with older software to see if he can't "fix it up a bit." Imagine a painter discovering a new type of canvas and redoing all his earlier pictures.

Eric is a computer person. "Ever since high school I've been interested in getting a computer. I just knew that they would be neat if they ever got to where a normal person could afford them." Eric feared that if he ever got started, the limited access to the machines at his school would stifle him. He did "a bit of programming" in college and some free-lance work.

Eric and a colleague at Whitesmith, an unincorporated partnership for computer graphics work, use a 32K CoCo with Extended Color Basic. A multi-expansion port, disk drives, and an Amdek monitor round out their equipment. He has written custom software for printer dumps.

"Recently we have been working on a program that will do printer dumps for us; It does all sorts of wild stuff: four-color separations, enlargements of certain areas. We're trying to get a color printer—an ink-jet or ribbon-based printer."

The X-Pad that Eric uses came without software—the artist writes his or her own. Radio Shack has discontinued the X-Pad in favor of the Koala Pad, which didn't impress Eric because of the pre-packaged software he used it with on another computer. "It doesn't do the same things mine does." Drivers of customized racers are seldom impressed by stock cars.

The future for Whitesmith looks like a Micron Eye camera—"a digitizing device that will enable us to take any artwork and do any enlargement, any reduction, any rotation of any degree." Eric sees a significant development for commercial art in all this technology. "Computer graphics could replace a lot of magazine artists. It's not for every artist, but the future will be a machine that looks like the Apple Macintosh. Not the Mac, but a machine that does some of the things the Mac does." In color, it is to be hoped.

Using the Micron Eye camera, Whitesmith could restart with a logo, "take the image, touch it up—the camera images aren't much good—make it look pretty, take a piece of one picture, turn it around, do whatever I want, maybe incorporate it into another picture." Eric advises that students of the graphic arts who hope to be working in 20 years learn something about computing. "What works best is a programmer-artist combination; the artist knows what he wants and the programmer knows how to do it. The system of the future will be designed by the people who use it."

Ron Kiyomura was trained to be an artist, not a computerist. "I was an art major at UCLA," he says. "One of my favorite media was watercolor. Working with paper I have more flexibility. With the computer it's an on/off thing." Like most art students, Ron was exposed to a wide variety of media at school: oils, water color, pencil, charcoal, prints, and more. He believes that the experience of dabbling in many kinds of creation helped prepare him for the tech-

Artwork by Eric White

Artwork by Ron Kiyomura

nological art he does now.

"The computer is just another medium to adjust to. It has limits and strengths. It's interesting to see the different sorts of effects I can get with the computer. There is always a challenge in something different."

Photography, for instance, was a challenge to accepted notions of art in the late 19th century. The camera not only defined a new medium for artists like Steichen and Steiglitz, it forced the more traditional media—oils and such—to turn away from realism, away from "photogenic" reproduction, as we call it now. Ron imagines that the computer could have something of that camera effect in the late 20th century. And, just as the photograph also changed the nature and purpose of the art gallery, the computer and modem might make art accessible in a new light.

Print-making, an earlier technological innovation, altered the availability of art in the European Middle Ages. Ron finds that computer art is "more like print-making than water color," using a revealing historical analogy. "When you do a watercolor," he observes, "it has to come out right the first time." Like Ana Landa and Eric White, Ron believes that the computer gives him room for mistakes that are often creative. The artist is free to play.

But Ron notes an immense block to his CoCo creativity; "I haven't been real successful at coming up with a lot of colors. This is limiting, but an artist works within and around the limitations. It's not how I make my living, but I guess I am an artist."

Ron earns his daily bread and pays for his garret by working at a Radio Shack store, where he repairs uncooperative computers. "For my artwork," he believes, "that means things that might mean panic to some people don't scare me." An error message or a whining disk drive doesn't slow Ron Kiyomura down. "I know how to take the computer apart and fix it," he points out. For instance, a common CoCo maintenance problem: "The disk controller is apt to become oxidized,—to get dirty. I know to get in there and clean it."

Employment at the source doesn't mean that Ron uses only the latest "state-of-the-art" equipment. "For graphics I use the Graphicom package, a modified Kraft joystick—I mean a Radio Shack joystick, they look just alike—and a color monitor. Essentially that's it. The color monitor is great. It's a lot easier on the eyes than the TV."

Ron's complaint with the limitations of computer art are closely tied to his experience with the equipment. "The VDG chip in the CoCo is a big hindrance. I guess it was improved for the Commodore 64"—a machine that Ron tried and liked. "The CoCo supports only four colors in high-resolution; the 64 supports 16. I know how expensive it would be, but that's the kind of change I'd like to see in the machine."

The parent company—Ron's employer—comes in for some mild criticism. "Radio Shack is really strange. They offered no (software) support for the X-Pad. And now there's no software for the Radio Shack Touch Pad that replaced it."

Ron is quick to modestly assert that he's been doing computer art for only a year now, "and for the last few months I've been doing nothing. But people keep after me to do more artwork. Nothing that I've done would I consider to be really serious. Most of my stuff lately—let's say it's 90 percent bad, although some is really good—most of the good stuff I uploaded onto CompuServe (#72256,2737). I'd like to get back into that."

The most popular of Ron's works on CompuServe has been a picture of "a naked person." Ron isn't thinking of becoming a pornographer, but he can see what sells. He likes the open market for art that telecommunications offers. "CompuServe as a gallery—I can see what others are doing, get extra ideas, and show my own work, too. For a beginning artist. . . I would recommend CompuServe. It is expensive, compared to the hardware, but if the artist is isolated, it's a great way to meet others."

To the beginner, Ron offers this wisdom: "Drawing with the computer will take patience and perseverance. It's a joystick and is going to be frustrating at the start." Remember the first time you picked up a pencil?

To Tolstoy and Aristotle, who asked: "What is art? What is good?"—a bit more wisdom. Ron Kiyomura has found a technological fix as an answer. "I look at my ratings on CompuServe—how many downloads. I count the downloads and I know how good my work was."■

Address correspondence to Paul Statt, c/o HOT CoCo, *80 Pine Street, Peterborough, NH 03458. Paul Statt is a free-lance writer who writes a regular column in* PICO—The Briefcase Computer Report.

BY WILLIAM H. RONEY

TRIG IT!

Who says Art and Math don't mix?
These short routines prove that they do.

Relatively simple trigonometry can be applied to achieve artful pictures with the Color Computer. Trigonometry's sines and cosines effectively produce the curvature seen in most of nature, including animals, vegetation, and people—and often in man-made things, such as the Jefferson Memorial, Fords, and hockey sticks. It's pretty hard to draw those things with just LINE, DRAW, and CIRCLE commands, even though a circle is shaped by a trig formula.

Now don't let sine and cosine (or even tangent and arctangent), frighten you. Radio Shack tells about SIN and COS in the *Getting Started* manual that came with your CoCo. It explains how to determine the value of angles and sides of triangles, the main stuff of trig, but it doesn't tell you how to apply SIN and COS to graphic art. The *Going Ahead* manual does give a sample program for drawing SIN/COS curves, but that's about all.

About the Listings

The 11 art programs contain no GOSUB, RETURN, or GOTO commands (except in line 999 GOTO 999 to end a program) that keep you frantically chasing up and down the listing to see how the program works.

Most programs are not confined to trig procedure but provide more common Basic procedures to give artistic context, such as sunlight reflections on water, small birds, and clouds.

All programs are in PMODE 4 to take advantage of high resolution. Color is not an important consideration. It is usually introduced into the screen image by the TV's "color fringe" effect, the color set (zero or one) in the SCREEN statement, or the color adjustments of the TV. If you insist on lots of color, use

System Requirements

16K RAM
Extended Color Basic

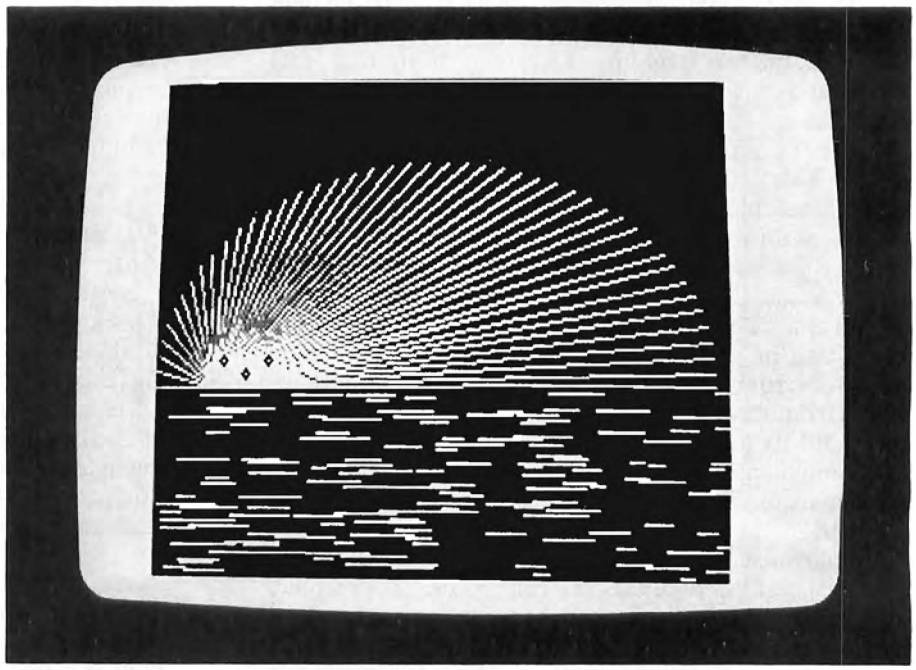


Photo 1. Beaver Emerging from a Pond

This program is available on our Instant CoCo cassette.
See the Instant CoCo ad elsewhere in this issue.

a PMODE less than four, with appropriate PCLS and screen codes, followed in a separate line segment by a COLOR statement (e.g., PMODE 3,1:PCLS 3:SCREEN 1,0:COLOR 2,3). Forget PAINTing, as it applies to tightly closed boundaries of areas to be painted, few of which are in these programs. A PAINT job can ruin your masterpiece.

For analyzing coordinate positions on the screen, especially when composing your own programs, refer to the suggested Graphics Guide of Program Listing 12. You can stop a program at any point to study its progression and get ideas for other programs by simultaneously pressing the shift and @ keys. Press any key to continue.

Dare to Experiment

Try to be a real artist as well as a good computerist. When you compose, give your main subjects contexts that do not rely wholly on trig, such as sunlight reflections and clouds, using nontrig procedures. Few things are completely suspended in empty space.

When you compose your own programs, dare to be experimental and even unorthodox. For example, try doubling up on RND to make it RND(RND(N)), or reverse the usual order of X,Y and make it Y,X in PSET and LINE statements. You'll be surprised and maybe pleased with the results.

Some of these programs run quite slowly, but be patient. Few artists expect to see their works born instantly before their eyes.

Leave It To Beaver

When I first spied the subject of Program Listing 1 in the woods, he looked like a porcupine. (See Photo 1.) But he was just emerging from a pond, so I figured he must be a beaver. This gives me an excuse to show how to create sunlight reflections on water.

The beaver himself is made by simple trig statements. Line 50 sets up an angle A that varies from 0 to 180 degrees, in steps of 4 degrees, to create a furry body. Line 70 converts the angle (at any moment) to radians, small fractions of circular arc that the computer can understand for graphics. (This is used in all the programs that follow.)

Lines 80 and 90 establish coordinates (X,Y) in the LINE statement of line 100, which draws the body. In line 80 the COS value varies from 1 to 0 as the angle A varies from 0 to 90 degrees and from 0 to −1 as the angle proceeds to 180 degrees. (Keep in mind that the COS of angles from 90 to 180 degrees is a *negative* value.) Thus, points on the X axis are plotted from 0 to 250. At the same time, the SIN function in line 90 positions the points vertically between 35 and 120 on the Y axis.

The result is to draw an imaginary, semielliptical curve stretching from 0 to 250. Each imaginary point on the curve is joined to a common, fixed coordinate (25,120) in line 100, thus producing the beaver's fur. Finally, the SIN function in line 90 works opposite to the COS. That is, the SIN varies from 0 to 1 as the angle varies from 0 to 90 degrees and from 1 to 0 as the angle proceeds to 180 degrees.

The beaver's eyes and nose in lines 140–160 are self-explanatory.

If you're not lost in the woods with all that trig, try out the sunlight reflections on the pond (lines 190–310). They don't rely on trig but use the familiar RND function and a single LINE statement. Try a different pattern of reflections by varying the parameters. If you want more sunlight showing, increase the value of N in line 190.

Stingrays and Strange Birds

Once when snorkling, I discovered Stingray (Program Listing 2) and thought I should transfer him to the TV screen. Lines 50–110 easily make his body. In this case, the COS and SIN statements contain expressions more complex than just COS(TH) and SIN(TH). They are expanded to COS (1 + SIN(TH)) and SIN(1 + COS(TH)). There is no advance insight that they are the forms needed, unless you are experienced in trig art. Like many other trig art procedures, they are the result of doodling and patient experimentation.

I couldn't recognize this creature when I saw him—hence Strange Bird in Program Listing 3. He apparently has two tails, possibly because he doesn't understand trig correctly.

At any rate, he illustrates how you can draw birds in general, and you're back to simple COS(TH) and SIN(TH). The outcome is controlled by line 70 in

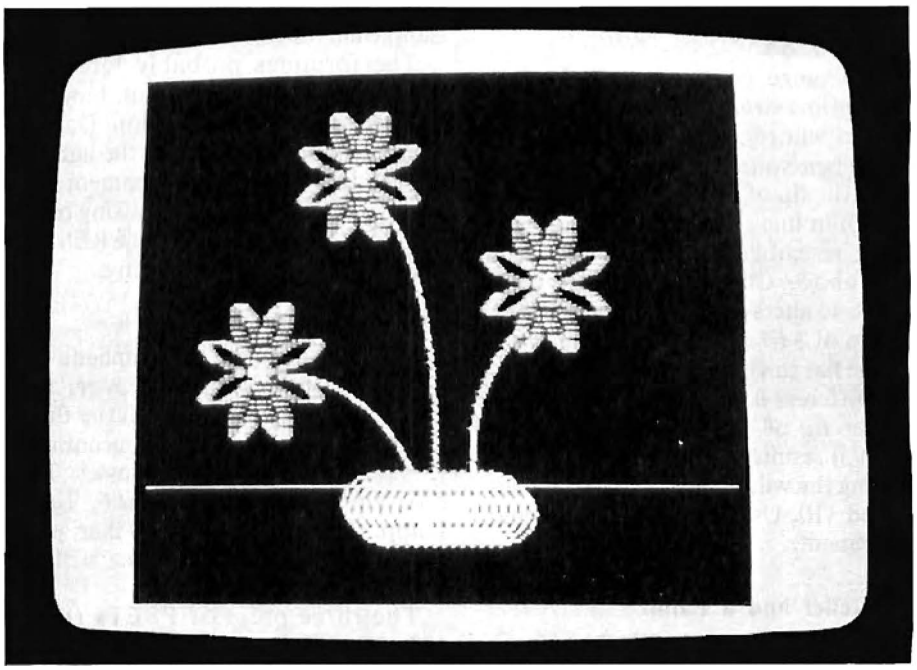


Photo 2. Ribbon Flowers

the manner explained. If you increase the bird's size over 100, the program will probably crash. Try changing the parameters for different sizes, shapes, and textures—without crashing. When moving about on the screen, the bird has a bad habit of trying to stick his tail beyond the screen border and crashing the program. This touchy character also has a habit of detaching his head when, in lines 110 and 120, the origin point (125,95) is changed.

Good luck trying to keep this bird under control.

Which Witch's Hat?

I found this hat (Program Listing 4) on my porch floor after the trick-and-treaters had wearily gone home. To create it, first spread out the brim by changing the STEP value of line 40 to 10. Now note the upper segment. It's formed by interconnecting coordinates as follows: (X,Y) to (X1,Y1) in line 160, (X1,Y1) to (X1,Y1-10) in line 170, (X1,Y1-10) to (X,Y) in line 180, and (X,Y) to (60,60) in line 190.

These segments are successively drawn in an arc of 90 degrees, determined in line 40, thus producing the hat's brim in three-dimensional perspective. Now restore the STEP value of line 40 to 5.

To change perspective of the hat: Change line 40 to show 359 degrees (360 degrees will result in a double impression when you run the program), and move the tip of the hat from (60,60) to (80,80) in line 190. The hat is now circular, resembling a sombrero as seen from above. Changing the STEP value of line 40 alters the character of the hat. A step of 3 to 5 appears best.

The hat can be transformed into several different designs. In line 190, shifting the tip of the hat from (60,60) to (125,95) results in several designs when altering the values of M and M1 in lines 60 and 110. Use your imagination and experiment.

Net Relief and a Lamp

Program Listing 5, 3-D Net, is an easy one, just to give you some relief. But it's an effective drawing in 3-D perspective, even if it won't haul in many fish.

Try changing the parameters in line 90, such as (95,X) for (X,95), and (Y,125) for (125,Y). You'll get a startling design if you hit the right combination. Most other programs in 3-D perspective take many more lines. This one shows the magic of trig graphics.

I came across this lamp in Program Listing 6 at a flea market. It looks old-fashioned but rather pretty. It's slow to developwhen run. Be sure to wait about two minutes for the long table line to appear at the end.

Why so slow? The answer is in an explanation of the program. After running the program as written, change line 80 to read "ST = 5 + (etc.)", and in line 90 change the width from 35 to 50. This change spreads the horizontal lines and increases the space between the dots which form them, by increasing the STEP(ST) value of line 80. (Behold! Another creation—some kind of vessel.)

Now observe the vertical SIN and COS curves composed of dots. These curves are squeezed tightly together in the original lamp program as they approach the lower edge of the shade, producing a solid image of the lamp. Simple curves form the lamp.

The formulas probably look like nonsense to a mathematician, but they work for graphics. Conclusion: Dare to be unorthodox. Here again the lamp is the product of tedious experiment and random imagination. Try drawing other kinds of lamps by following the REM instructions in the program listing.

Champagne and Flowers

Program Listing 7, Champagne for Three, is tempting. However, the glasses will not be filled until the three guests have arrived. In the meantime, let's see how to create the glasses. The program is similar to Listing 6, Table Lamp. If you understood that program, the details of this one will be clear.

The three pairs of PSETs (lines 130,150; 190,210; and 250,270) split the program (lines 40–90) into three parts, producing the three glasses at different positions. Again, the program is based on vertical SIN and COS curves cut off at two Y axis points (40 and 70, in line 40).

Try changing the parameters in different ways to get unpredictable objects that probably won't hold champagne. For an ambitious learning exercise, try putting one glass by the previous lamp (Listing 6), on the same table. Now you need some flowers to complete the party setup, so move on to Program Listing 8, Ribbon Flowers.

I have actually batted out these flowers on my keyboard. (See Photo 2.) They show that it takes SIN and COS to get curvature for advanced graphics. You can't do these with just LINE, DRAW, and CIRCLE commands.

This is an arduous program to compose and not a snap to understand. Nevertheless, please bear with me for a reward of merit: the satisfaction that comes from aesthetic creation with a computer.

The program (lines 50–180) is split into three parts—the three blossoms in lines 150–170. The general procedure is similar to those in previous listings. You can change the number of petals on the blossoms by altering the number in line 80. If you want more petals, it will take longer to run the program. If you change the position of the blossoms, they will leave their stems high and dry. The latter are made with a separate subprogram.

Drawing the vase (lines 210–240) is not hard. It's when you get to the stems that exasperation sets in. It takes trial and error to get the arcs (stems) of the right radius (of their parent circles) and length. This is where Listing 12's Graphics Guide comes in handy. With the guide, you can estimate the radius of the arc and its proper coordinates. Just make sure the center of the arc is within the boundaries of your screen. Otherwise, the program will probably crash.

Mountain Majesty

The volcanic giants in Program Listing 9, Mountain Scene, slowly take shape on your screen. They are drawn with slowly swinging LINEs pivoted at

their peaks (lines 100, 150, and 200). Two of the mountains have craters from ancient eruptions (lines 250–280). The foreground clouds leisurely roll in to the foot of the large mountain (lines 320–410). Finally, small clouds in the distance fill in the rest of the expanse (lines 430–500), and you have a panoramic view.

Line 60 is quite unorthodox as a trig formula, using TAN and ATN for the first time in these programs. However, it works for graphic mountains. Delete the TAN and "1 + ATN" parts, and you'll see how simplification destroys the picture. Also, line 60 permits simpler statements by substitution in lines that follow.

The key to making craters is to use a color in lines 260–270 that matches the background color, so the craters erase the peaks.

In making clouds, note the rare use of a double random, RND(RND(70)), in line 350. This concentrates the clouds in the distance, thereby providing perspective. You may determine the number of clouds in both cases by changing the value of N in lines 320 and 430.

Turn this picture into a fantasy, as follows:

1) Change line 30 to PMODE 3,1:PCLS 3: SCREEN 1,0.
2) Add line 36 COLOR 2,3.
3) Add line 37 POKE 178,56.

You now have striped mountains (by the POKE statement) and yellow clouds of smoke belching from the craters. Delete the POKE statement to eliminate the stripes.

For a grand finale of bizarre coloring, add line 510 PMODE 4,1: SCREEN 1,0. The special effect comes at the end of the RUN.

When using the POKE procedure, POKE 178,N, "N" is a particular number in the range 127–255 or is a variable, short range such as 127 to 130. As an example:

```
FOR N = 127 to 130
POKE 178,N
NEXT N
```

Short ranges such as the above seem to give better effect than long ranges such as 127 to 200. By now you probably feel like you've climbed the highest mountain.

Bird and Bath

If you stand on the shore of Lost Lake some late evening, you'll probably see the glowing Devilbird skimming over the water. You'll see his fiery wings reflected by the lake, and in disbelief you'll vow never again to indulge in so much tempting CoCo.

The first part of Program Listing 10, Devilbird, (lines 50–140) produces the wings, which you can reshape if you wish. (See Photo 3.) The remarks explain the program. You can improve on the body. As drawn here, it's just a hurried suggestion.

The rest of the program is in normal Basic. The reflection in the water is done in the same manner as you used in Listing 1, Beaver/Porcupine. The distant birds are a bit tricky, being made with small arcs of circles to serve as wings. The punch line is number 530, which throws the scene into a reddish glow. Be sure the color controls on your TV are adjusted properly for this effect.

Program Listing 11, Bird Bath, is for the birds that inhabit your yard, not including the Devilbird of the last program. It's no ordinary bird bath, since you can change it into a more ornate form.

Line 60 permits you to widen or narrow it by altering the range of M. The RND value in the same line controls the texture of the horizontal lines. Birds like something rather solid, so don't make the RND value too large.

In line 90, altering the ratio changes the height of the bath. Some birds like it tall; others prefer it short. If you wish to make a more ornate bath, do as follows:

1) Add line 37 to read FOR N = 1 to 4.
2) In line 40 change STEP 5 to STEP 3 + RND(7).
3) Change line 130 to NEXT M,A,N.

This causes the program to pass down the Y axis N times (four in this case). You can make the bird bath more solid by increasing the value of N. If you make N large enough (say eight), a solid white bath will eventually appear. The larger the value of N or any RND number, the longer it will take to complete the picture. The two versions given here require about two and three minutes, respectively.

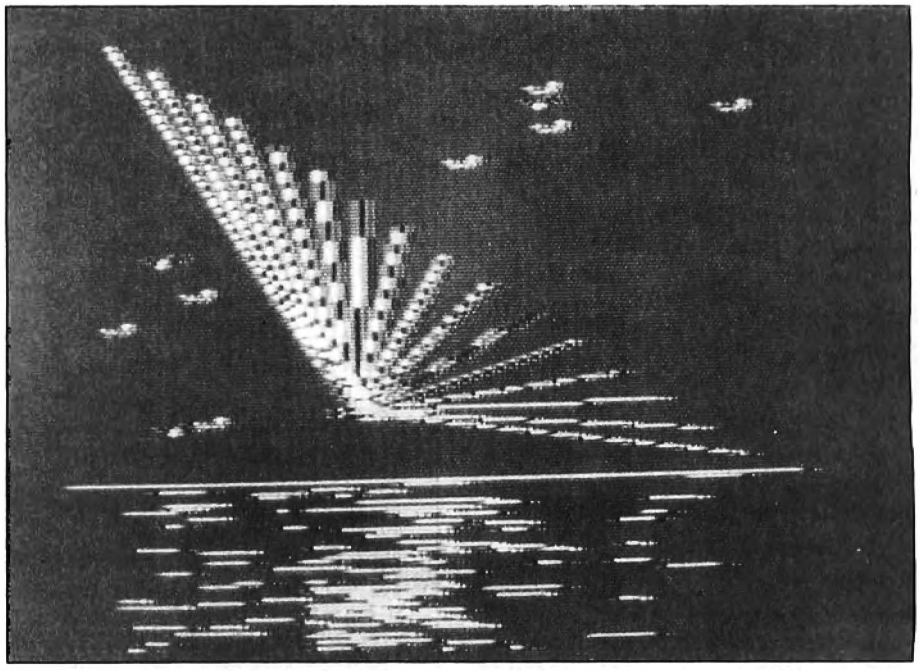


Photo 3. Devilbird

Graphics Guide

Program Listing 12 offers the option of comparing coordinates in the previous program listings with the display screen coordinates during or after running the programs, or you can use the guide as an aid in composing other graphics programs.

The grid display consists of points (dots), 0-255 on the X axis and 0-190 on the Y axis, at intervals of 10 spaces horizontally and vertically; and two solid X axis and Y axis reference lines intersecting at coordinate 125,95, the middle of the grid.

You can type in and run the guide before you enter any other program. (Recording the guide to tape or disk and merging it with other programs is helpful.) Lines 10 and 20 may be written in any form, such as placing the file name in line 10 and the subject in line 20. You can use any PMODE in line 30, but PMODE 4,1 gives the best results for the previous programs.

Lines 31-35 produce the guide. Consider them to be temporary while you study an existing program or compose a new one. In the latter case, switch back and forth between LIST and RUN to determine appropriate coordinates for the program.

The program (aside from the PMODE in line 30) should start at line 40 (thus eliminating the remark as shown). Be sure to enter line 999 GOTO 999 (end of program) before running the guide; otherwise, the program is likely to crash when you use the guide. (Avoid using 999 END, which will probably result in a crash.) Also, be sure to anticipate using any ending line number larger than 999 if a program exceeds line number 999.■

Address correspondence to William H. Roney, 309 North Virginia Ave., Falls Church, VA 22046.

Program Listing 1. Beaver/Porcupine

```
10 REM**LISTING 1
20 REM**BEAVER/PORCUPINE
30 PMODE 4,1:PCLS:SCREEN 1,1
40 REM*BODY
50 FOR A=0 TO 180 STEP 4 'STEP
60 ' VALUE CONTROLS TEXTURE
70 TH=A/57.3
80 X=125-125*COS(TH)
90 Y=120-85*SIN(TH)
100 LINE(25,120)-(X,Y),PSET 'DRA
WS BODY
120 NEXT A
130 REM*EYES AND NOSE
140 CIRCLE(30,110),2,2
150 CIRCLE(50,110),2,2
160 CIRCLE(40,115),2,2
170 REM*SUNLIGHT REFLECTIONS
180 ' ON POND
190 FOR N=1 TO 150 'CONTROLS NUM
BER OF REFLECTION LINES
210 X=RND(250) 'CONTROLS HORIZON
TAL PLACEMENT OF REFLECTION LINE
S
240 Y=120+RND(70) 'CONTROLS VERT
ICAL PLACEMENT OF REFLECTION LIN
ES
270 Z=5+RND(25) 'CONTROLS LENGTH
 OF REFLECTION LINES
290 LINE(X,Y)-(X+Z,Y),PSET 'DRA
300 ' WS REFLECTION LINES
310 NEXT N
999 GOTO 999
```

Program Listing 2. Stingray

```
10 REM**LISTING 2
20 REM**STINGRAY
30 PMODE 4,1:PCLS:SCREEN 1,1
40 REM*MAIN BODY
50 FOR A=0 TO 360 STEP 3
60 TH=A/57.3
70 X=75+100*COS(1+SIN(TH))
80 Y=35+100*SIN(1+COS(TH))
90 LINE(50,35)-(X,Y),PSET 'DRA
100 ' WS BODY
110 NEXT A
120 REM*TAIL
130 LINE(174,135) - (214,175),PS
ET
140 LINE(175,135) - (215,175),PS
ET
150 REM*EYES
160 FOR R=0 TO 2
170 CIRCLE(55,50),R,2
180 CIRCLE(72,40),R,2
190 NEXT R
999 GOTO 999
```

Program Listing 3. Strange Bird

```
10 REM**LISTING 3
20 REM**STRANGE BIRD
30 PMODE 4,1:PCLS:SCREEN 1,1
40 REM*BODY/WINGS/TAIL
50 FOR A=0 TO 360 STEP 100
60 TH=A/57.3
70 FOR M=0 TO 100 STEP 5 'CON
80 ' TROLS SIZE OF BIRD (DON'T
90 ' EXCEED 100). STEP VALUE
100 ' CONTROLS TEXTURE OF WINGS
110 X=125+M*COS(TH)
120 Y=95+M*SIN(TH)
130 LINE(125,95)-(Y,X),PSET'DRA
140 ' WS BODY/WINGS/TAIL (NOTE
150 ' Y,X ORDER)
160 NEXT M,A
170 REM*HEAD
180 FOR R=0 TO 7
190 CIRCLE(130,95),R,1,.4
200 NEXT R
210 REM*HORIZON
220 LINE(5,120)-(85,120),PSET
230 LINE(135,120) - (250,120),PS
ET
999 GOTO 999
```

Program Listing 4. Witch's Hat

```
10 REM**LISTING 4
20 REM**WITCH'S HAT
30 PMODE 4,1:PCLS:SCREEN 1,1
40 FOR A=0 TO 90 STEP 5
50 TH=A/57.3
60 M=20 'CONTROLS SIZE AND CHAR
70 ' ACTERISTICS
80 C=COS(TH):S=SIN(TH)
90 X=125+M*C
100 Y=95+M*S
110 M1=80 'CONTROLS SIZE AND
120 ' CHARACTERISTICS
130 X1=125+M1*C
140 Y1=95+M1*S
150 REM*DRAW HAT
160 LINE(X,Y)-(X1,Y1),PSET
170 LINE(X1,Y1)-(X1,Y1-10),PSET
180 LINE(X1,Y1-10)-(X,Y),PSET
190 LINE(X,Y)-(60,60),PSET'PEAK
200 ' OF HAT
210 NEXT A
999 GOTO 999
```

Program Listing 5. 3-D Net

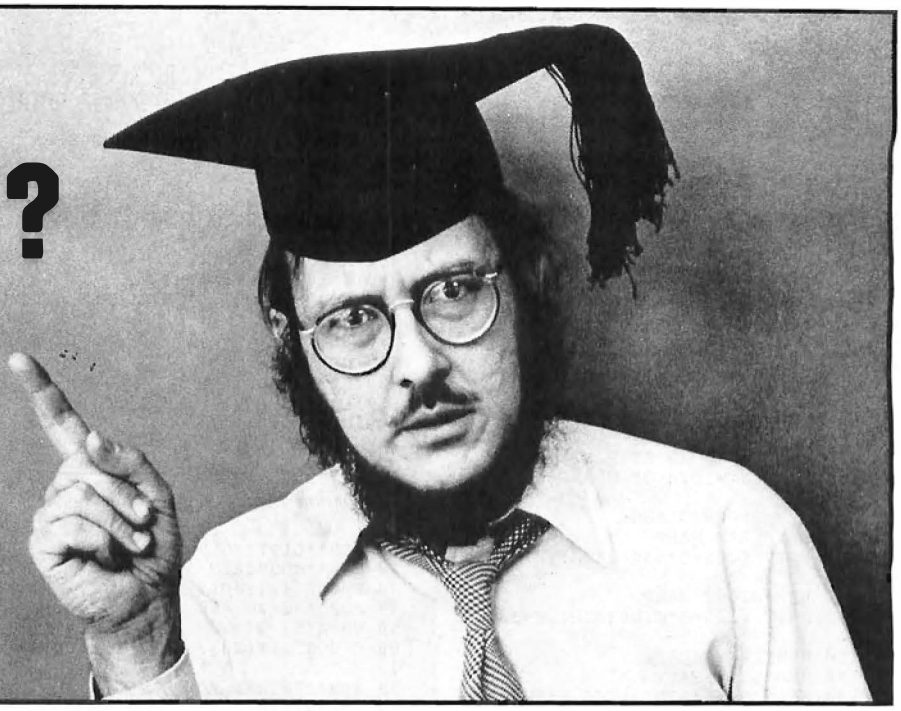
```
10 REM**LISTING 5
20 REM**3-D NET
30 PMODE 4,1:PCLS:SCREEN 1,1
40 FOR A=0 TO 359 STEP 6
50 TH=A/57.3
60 X=125+80*COS(TH)
70 Y=95+80*SIN(TH)
80 PSET(X,Y,1)'DRAWS DOT CIRCLE
90 LINE(X,95)-(125,Y),PSET 'DRA
100 ' WS NET
110 NEXT A
999 GOTO 999
```

Program Listing 6. Table Lamp

```
10 REM**LISTING 6
20 REM**TABLE LAMP
30 PMODE 4,1:PCLS:SCREEN 1,1
40 FOR A=75 TO 130 STEP 1.2
50 TH=A/57.3
60 N=6 'CHANGE TO 7 FOR ANOTHER
70 ' STYLE OF LAMP
80 ST=1+2*SIN(N*TH)
90 FOR C=1 TO 35 STEP ST 'CONT
100 ' TROLS WIDTH OF LAMP
110 N1=3 'CHANGE TO 5 FOR
120 ' ANOTHER STYLE OF LAMP
130 Y=A
140 REM*DRAW LEFT HALF OF LAMP
```

Listing continued

FEELING HELPLESS? YOU NEED TO LEARN A LESSON!



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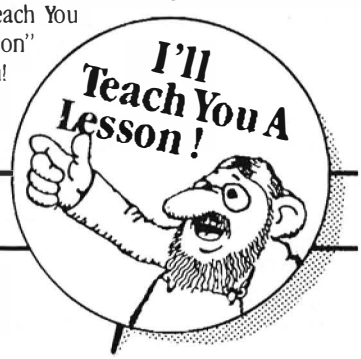

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Listing continued

```
15Ø PSET(125+C*SIN(N1*TH),Y,1)
16Ø REM*DRAW RIGHT HALF OF LAMP
17Ø PSET(125-C*SIN(N1*TH),Y,1)
18Ø NEXT C,A
19Ø REM*DRAW TABLE LINE
2ØØ LINE(5Ø,129)-(2ØØ,129),PSET
999 GOTO 999
```

Program Listing 7. Champagne for Three

```
1Ø REM**LISTING 7
2Ø REM**CHAMPAGNE FOR THREE
3Ø PMODE 4,1:PCLS:SCREEN1,1
4Ø FOR A=4Ø TO 7Ø STEP 1.2
5Ø TH=A/57.3
6Ø ST=1+2*SIN(TH)
7Ø FOR C=1 TO 35 STEP ST 'CON
8Ø ' TROLS WIDTH OF GLASSES
9Ø Y=A
11Ø REM*UPPER GLASS:
12Ø REM*LEFT HALF
13Ø PSET (125-C*SIN(3*TH),Y+3Ø,1
)
14Ø REM*RIGHT HALF
15Ø PSET (125+C*SIN(3*TH),Y+3Ø,1
)
17Ø REM*LEFT GLASS:
18Ø REM*LEFT HALF
19Ø PSET(5Ø-C*SIN(3*TH),Y+5Ø,1)
2ØØ REM*RIGHT HALF
21Ø PSET(5Ø+C*SIN(3*TH),Y+5Ø,1)
23Ø REM*RIGHT GLASS:
24Ø REM*LEFT HALF
25Ø PSET (2ØØ-C*SIN(3*TH),Y+5Ø,1
)
26Ø REM*RIGHT HALF
27Ø PSET (2ØØ+C*SIN(3*TH),Y+5Ø,1
)
28Ø NEXT C,A
999 GOTO 999
```

Program Listing 8. Ribbon Flowers

```
1Ø REM**LISTING 8
2Ø REM**RIBBON FLOWERS
3Ø PMODE 4,1:PCLS:SCREEN1,1
4Ø REM*THE BLOSSOMS
5Ø FOR A=Ø TO 36Ø STEP 1.5
6Ø TH=A/57.3
7Ø B=25 'SIZE OF FLOWER
8Ø N=4 '2*N=NUMBER OF PETALS ON
9Ø ' EACH BLOSSOM
1ØØ R=B*SIN(N*TH) 'MULTIPLIER
11Ø X=9Ø+R*COS(TH)
12Ø Y=4Ø+R*SIN(TH)
13Ø FOR Z=1 TO 5 STEP 2'Z DIMEN
14Ø ' SION OF RIBBON
15Ø PSET(X+Z,Y,1) 'MIDDLE BLOSSO
M
16Ø PSET(X+Z-4Ø,Y+7Ø,1) 'LEFT BL
OSSOM
17Ø PSET(X+Z+8Ø,Y+4Ø,1) 'RIGHT B
LOSSOM
18Ø NEXT Z,A
19Ø '
2ØØ REM*VASE
21Ø FOR X=1ØØ TO 15Ø STEP 4
22Ø FOR Z=1 TO 6 STEP 2
23Ø CIRCLE(X+Z,155+Z),15,5,.75
24Ø NEXT Z,X
25Ø '
26Ø REM*FLOWER STEMS:
27Ø REM*LEFT STEM
28Ø FOR A=27Ø TO 36Ø
29Ø TH=A/57.3
3ØØ X=6Ø+6Ø*COS(TH)
31Ø Y=17Ø+6Ø*SIN(TH)
32Ø FOR Z=1 TO 2 'THICKNESS OF S
TEM
33Ø PSET(X+Z,Y+Z,1) 'DRAWS STEM
34Ø NEXT Z,A
35Ø '
36Ø REM*RIGHT STEM
37Ø FOR A=31Ø TO 365
38Ø TH=A/57.3
39Ø X=2ØØ-6Ø*COS(TH)
4ØØ Y=14Ø+6Ø*SIN(TH)
41Ø FOR Z=1 TO 2 'THICKNESS OF S
TEM
42Ø PSET(X+Z,Y+Z,1) 'DRAWS STEM
43Ø NEXT Z,A
44Ø '
45Ø REM*MIDDLE STEM
46Ø FOR A=27Ø TO 365
47Ø TH=A/57.3
48Ø X=95+3Ø*COS(TH)
49Ø Y=14Ø+9Ø*SIN(TH)
5ØØ FOR Z=1 TO 2 'THICKNESS OF S
TEM
51Ø PSET(X+Z,Y+Z,1) 'DRAWS STEM
52Ø NEXT Z,A
53Ø REM*TABLE LINE
54Ø LINE(5,15Ø)-(25Ø,15Ø),PSET
999 GOTO 999
```

Program Listing 9. Mountain Scene

```
1Ø REM**LISTING 9
2Ø REM**MOUNTAIN SCENE
3Ø PMODE 4,1:PCLS:SCREEN 1,1
4Ø FOR A=Ø TO 15Ø STEP Ø.8
5Ø TH=A/57.3
6Ø C=COS(TAN(TH)):S=SIN(1+ATN(TH
))
7Ø REM*CENTRAL MOUNTAIN
8Ø X=1ØØ+1ØØ*C
9Ø Y=35+1ØØ*S
1ØØ LINE(1ØØ,35)-(X,Y),PSET 'DRA
WS MOUNTAIN
12Ø REM*2ND MOUNTAIN
13Ø X=2ØØ+5Ø*C
14Ø Y=5Ø+5Ø*S
15Ø LINE(2ØØ,5Ø)-(X,Y),PSET'DRA
16Ø ' WS MOUNTAIN
17Ø REM*SMALL MOUNTAIN
18Ø X=21Ø+25*C
19Ø Y=9Ø+3Ø*S
2ØØ LINE(21Ø,9Ø)-(X,Y),PSET'DRA
21Ø ' WS MOUNTAIN
22Ø NEXT A
23Ø REM*REDUCE FIRST TWO PEAKS
24Ø ' TO MAKE CRATERS
25Ø FOR R=Ø TO 2Ø
26Ø CIRCLE(1ØØ,35),R,2,Ø.5
27Ø CIRCLE(2ØØ,5Ø),R,2,Ø.5
28Ø NEXT R
29Ø REM*HORIZON
3ØØ LINE(3,85)-(47,85),PSET
31Ø REM*MAIN CLOUDS
32Ø FOR N=1 TO 7Ø'CONTROLS DENS
33Ø ' ITY (NUMBER) OF CLOUDS
34Ø X=RND(25Ø)
35Ø Y=13Ø+RND(RND(7Ø))
36Ø R1=RND(18)'VARIABLE SIZE OF
37Ø ' CLOUDS
38Ø FOR R=Ø TO R1
39Ø CIRCLE(X,Y),R,1,Ø.25 'DRAWS
4ØØ ' CLOUDS
41Ø NEXT R,N
42Ø REM*CLOUDS AROUND SMALL
425 ' MOUNTAIN
43Ø FOR N=1 TO 9Ø 'CONTROLS DEN
44Ø ' SITY (NUMBER) OF CLOUDS
45Ø X=18Ø+RND(75)
46Ø Y=115+RND(2Ø)
47Ø R=3+RND(5)
48Ø CIRCLE(X,Y),R,1,.4,Ø.5 'DRA
49Ø ' WS CLOUDS
5ØØ NEXT N
999 GOTO 999
```

Program Listing 10. Devilbird

```
1Ø REM**LISTING 1Ø
2Ø REM**DEVILBIRD
3Ø PMODE 4,1:PCLS:SCREEN 1,1
4Ø REM*WINGS
5Ø FOR N=1TO16'NUMBER OF RIBS
6Ø ' IN WINGS (HALF IN EACH)
7Ø A=3Ø:TH=A/57.3'VALUE OF 'A'
8Ø ' CONTROLS SHAPE OF WINGS
9Ø R=17 'VALUE CONTROLS DIP OF W
INGS
1ØØ X=N*R*COS(TH)
11Ø Y=N*R*SIN(TH)
12Ø LINE(1ØØ,12Ø)-(X,Y),PSET'DR
13Ø 'AWS WINGS
14Ø NEXT N
15Ø REM*BODY
16Ø CIRCLE(1Ø5,12Ø),8,1,.3
17Ø REM*HEAD
18Ø CIRCLE(95,12Ø),3,1,.5
19Ø REM*HORIZON
2ØØ LINE(Ø,14Ø)-(255,14Ø),PSET
21Ø REM*BIRD'S DIRECT REFLECTION
 IN WATER
23Ø FOR N=1 TO 75
24Ø X=8Ø+RND(5Ø)
25Ø Y=14Ø+RND(5Ø)
26Ø Z=5+RND(2Ø)
27Ø LINE(X,Y)-(X+Z,Y),PSET
28Ø NEXT N
29Ø REM*BIRD'S SCATTERED REFLECT
ION
31Ø FOR N=1 TO 75
32Ø X=15+RND(2ØØ)
33Ø Y=14Ø+RND(5Ø)
34Ø Z=5+RND(15)
35Ø LINE(X,Y)-(X+Z,Y),PSET
36Ø NEXT N
37Ø REM*BACKGROUND BIRDS(UPPER)
38Ø FOR N=1 TO 5 'CONTROLS NUM
39Ø ' BER OF BIRDS
4ØØ X=135+RND(115)
41Ø Y=1Ø+RND(4Ø)
42Ø CIRCLE(X,Y),7,3,.75,.1,.4 'D
RAWS
43Ø ' BIRDS
44Ø NEXT N
45Ø REM*BACKGROUND BIRDS(LOWER)
46Ø FOR N=1 TO 5 'CONTROLS NUM
47Ø ' BER OF BIRDS
48Ø X=1Ø+RND(4Ø)
49Ø Y=7Ø+RND(6Ø)
5ØØ CIRCLE(X,Y),7,3,.75,.1,.4 'D
RAWS
51Ø ' BIRDS
52Ø NEXT N
53Ø PMODE3,1:SCREEN 1,1 'COLORS
54Ø ' PICTURE
999 GOTO 999
```

Program Listing 11. Bird Bath

```
1Ø REM**LISTING 11
2Ø REM**BIRD BATH
3Ø PMODE 4,1:PCLS:SCREEN 1,1
4Ø FOR A=12Ø TO 22Ø STEP 5
5Ø TH=A/57.3
6Ø FOR M=Ø TO 5Ø STEP RND(3) 'CO
N
7Ø 'TROLS WIDTH & LINE TEXTURE
8Ø X=125+M*COS(5*COS(TH))
9Ø Y=A/2'RATIO CONTROLS HEIGHT
1ØØ REM*DRAW PICTURE
11Ø PSET(X,Y,1)
12Ø PSET(125-M*COS(5*COS(TH)),Y,
1)
13Ø NEXT M,A
999 GOTO 999
```

Program Listing 12. Graphics Guide

```
1Ø REM**LISTING 12
2Ø REM**GRAPHICS GUIDE
3Ø PMODE 4,1:PCLS:SCREEN 1,1
31 FOR X=Ø TO 255 STEP 1Ø
32 FOR Y=Ø TO 19Ø STEP 1Ø
33 PSET(X,Y,1):NEXT Y,X
34 LINE(Ø,95)-(255,95),PSET
35 LINE(125,Ø)-(125,19Ø),PSET
4Ø REM*START PROGRAM ON THIS LIN
E
999 GOTO 999 'END OF PROGRAM
2ØØØ '
2Ø1Ø REM * DELETE LINES 31-35 WH
EN
2Ø2Ø 'PROGRAM IS COMPLETED. END
2Ø3Ø 'PROGRAM WITH LINE NUMBER
2Ø4Ø 'LARGER THAN 999 IF NEEDED.
```

END

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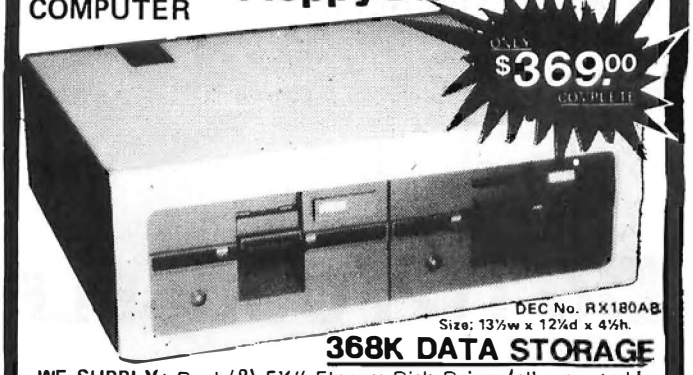

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BY R. STEVEN BERRY

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When you've completed your graphics masterpiece, how do you send a copy to Mom? If you have a printer and the right program, you do a dump of the TV screen to the printer. Writing this program yourself involves three steps:

- Understanding how data is displayed on the TV screen.
- Understanding how data is printed by the printer.
- Designing a routine to reformat the data.

Assembly language is necessary for this project because the printer uses only a small part of each byte at a time (see Program Listing 1, Screen Dump); Basic cannot do the required bit manipulation. If you don't have an assembler, study this article to learn the process and then use the Basic Program Listing 2 to produce the finished machine-language program. The program listing is for Radio shack's EDTASM+

Screen Format

Each dot of light (called a pixel) on the TV screen is controlled by the computer's video display generator (VDG). The data that tells the VDG to set (lighten) or clear (darken) the pixels are stored in memory. When the normal text screen is displayed, byte &H400 (1024) is the first space in the upper left corner of the screen. There are 512 (&H200) spaces for characters on the text screen, so the memory address of the last byte is 1535 (&H5FF).

Try POKEing some numbers within this range to see the process in action. For example, POKE &H500,255. This puts a small orange square half-way down the edge of the screen. In the text mode, a specific letter, number, or graphic character is displayed for each byte in this section of memory. The character generator does this automatically. The printer uses a similar system for printing characters on paper.

When graphics are displayed, the character generator isn't used. Every byte of data is directly displayed on the screen. Disk system graphics memory begins at &H0E00 (&H600 on nondisk systems). The number 170 (&H0AA) is 10101010 in binary. This byte is displayed on the graphics screen as a small row of dots, eight pixels long. The pixels are set and cleared in an alternating pattern corresponding to the pattern of ones and zeros in the binary number being displayed. Type the following commands (and press the enter key) and POKE various numbers into the graphics memory:

```
PCLS:POKE 359,57:PMODE4,1.
```

When you type "SCREEN 1," you see a plain screen. To switch back to text, type "SCREEN 0." POKE a variety of numbers into memory between &H0E00 and &H25FF (nondisk systems between &H600 and &H1DFF). You can't see what you type while in this mode, so enter your commands while in the text mode. When you're ready, type "SCREEN 1" to switch modes and see the product. There are 256 pixels in each line of the screen and each pixel is controlled by 1 bit. Since there are 8 bits per byte, there are 32 bytes per line. POKE several numbers into three or four locations 32 bytes apart and notice how a pattern begins to appear (e.g., A = &H0E40: B = A + 32: C = B + 32; POKE A,&HC3: POKE B,&H37: POKE C,&HC3).

Key: The screen is drawn in horizontal rows of 32 bytes (256 bits) in increments 1 bit high and 8 bits (1 byte) long. The VDG reads straight through the graphics memory and draws each line as it goes.

Printer Format

The printer also draws in rows across the paper, but it draws seven vertical dots at a time. It reads through memory (built into the printer itself) and prints stacks of dots across the page. In order to convert from TV to printer, it's necessary to collect 1 bit at a time from up to 7 bytes located one above the other on the screen. Recall locations A, B, and C from the last practice exercise. They were 32 bytes apart but were displayed as a vertical stack.

System Requirements
16K RAM
Extended Color Basic
Printer (DMP 100 or LP VII)
EDTASM + Optional

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```
                006F    00100 DEVNUM  EQU $6F
                A002    00110 CHROUT  EQU $A002
                0E00    00120 SCREEN  EQU $E00          DISK SYSTEM
                        00130 *SCREEN EQU $600          NON-DISK
                2600    00140 SCREND  EQU SCREEN+$1800
3E00                    00150         ORG $3E00
                        00160 *CONVERT SCREEN TO LP FORMAT
3E00 34   76            00170 START   PSHS A,B,X,Y,U
3E02 86   30            00180         LDA #48           SET # LINES
3E04 B7   3FB4          00190         STA LNCT          PER SCREEN
3E07 C6   FE            00200         LDB #-2
3E09 D7   6F            00210         STB DEVNUM
3E0B 30   8D 009D       00220         LEAX SETVAL,PCR SET PRINTER FOR
3E0F A6   80            00230 LP1     LDA ,X+           GRAPHICS MODE
3E11 81   FF            00240         CMPA #$FF
3E13 27   06            00250         BEQ BLDLIN
3E15 AD   9F A002       00260         JSR [CHROUT]
3E19 20   F4            00270         BRA LP1
3E1B 8E   0E00          00280 BLDLIN  LDX #SCREEN
3E1E 34   10            00290         PSHS X
3E20 33   8D 008F       00300 NXTLIN  LEAU PRTBUF,PCR
3E24 108E 0008          00310 LP2     LDY #8            8 COLUMNS
3E28 C6   04            00320 LP3     LDB #4            4 ROWS
3E2A 7F   3EAB          00330         CLR STORE
3E2D A6   84            00340 LP4     LDA ,X            GET A BYTE
3E2F 48                 00350         LSLA              THEN 1 BIT
3E30 76   3EAB          00360         ROR STORE         TO TEMP.
3E33 74   3EAB          00370         LSR STORE         PUT A SPACE
3E36 A7   84            00380         STA ,X            REPLACE
3E38 30   88 20         00390         LEAX 32,X         THEN DO NEXT
3E3B 5A                 00400         DECB
3E3C 26   EF            00410         BNE LP4
3E3E B6   3EAB          00420         LDA STORE         RE-GET TEMP
3E41 43                 00430         COMA              REVERSE B/W
3E42 84   D5            00440         ANDA #$D5         CLEAR SPACES
3E44 85   40            00450         BITA #$40         TEST FOR
3E46 27   06            00460         BEQ LP5           ADJOINING
3E48 85   10            00470         BITA #$10         SET BITS,
3E4A 27   0C            00480         BEQ LP6           AND FILL IN
3E4C 8A   20            00490         ORA #$20          SET FIRST SPACE
3E4E 85   10            00500 LP5     BITA #$10
3E50 27   06            00510         BEQ LP6
3E52 85   04            00520         BITA #$04
3E54 27   0C            00530         BEQ LP7
3E56 8A   08            00540         ORA #$08          SET SECOND SPACE
3E58 85   04            00550 LP6     BITA  #$04
3E5A 27   06            00560         BEQ LP7
3E5C 85   01            00570         BITA #1
3E5E 27   02            00580         BEQ LP7
3E60 8A   02            00590         ORA #$2           SET THIRD SPACE
3E62 A7   C0            00600 LP7     STA ,U+
3E64 1183 3FB3          00610         CMPU #BUFEND
3E68 2C   10            00620         BGE PRTLIN
3E6A 35   10            00630         PULS X
3E6C 34   10            00640         PSHS X
3E6E 31   3F            00650         LEAY -1,Y         DEC BIT COUNTER
3E70 26   B6            00660         BNE LP3
3E72 35   10            00670         PULS X
3E74 30   01            00680         LEAX 1,X          READY NEXT LINE
3E76 34   10            00690         PSHS X
3E78 20   AA            00700         BRA LP2
                        00710 *PRINT ONE LINE
3E7A 31   8D 0031       00720 PRTLIN  LEAY PRTVAL,PCR
3E7E A6   A0            00730 LP8     LDA ,Y+           GET A BYTE
3E80 AD   9F A002       00740         JSR [CHROUT]      SEND TO PRINTER
3E84 108C 3FB3          00750         CMPY #BUFEND
3E88 25   F4            00760         BLO LP8
3E8A 35   10            00770         PULS X
3E8C 30   88 61         00780         LEAX $61,X        NEXT COLUMN
3E8F 34   10            00790         PSHS X
3E91 86   0A            00800         LDA #$0A          SEND CR/LF
3E93 AD   9F A002       00810         JSR [CHROUT]
3E97 7A   3FB4          00820         DEC LNCT
3E9A 27   02            00830         BEQ EXIT
3E9C 20   82            00840         BRA NXTLIN
3E9E 35   10            00850 EXIT    PULS X
3EA0 86   1E            00860         LDA #$1E          RE-SET PRINTER
3EA2 AD   9F A002       00870         JSR [CHROUT]
3EA6 0F   6F            00880         CLR DEVNUM        RE-SET SCREEN
3EA8 35   76            00890         PULS U,Y,X,B,A
3EAA 39                 00900         RTS
3EAB                    00910 STORE   RMB 1
3EAC      1F12          00920 SETVAL  FDB $1F12
3EAE      FF            00930         FCB $FF
3EAF      1B10          00940 PRTVAL  FDB $1B10
3EB1      0000          00950         FDB $0
3EB3                    00960 PRTBUF  RMB $100
3FB3                    00970 BUFEND  RMB 1
3FB4                    00980 LNCT    RMB 1
          3E00          00990         END START
00000 TOTAL ERRORS
```

Program Listing 1. Screen Dump, Assembly Version

Key: The printer produces lines that consist of 256 (or more) increments seven dots high and one dot wide.

Reformatting Data

Follow the program listing as you read the next part. Define character out (CHROUT) to printer, device number (DEVNUM) (0=TV, −1=Tape, −2=Printer), SCREEN, and screen end (SCREND). Select the value for SCREEN needed for disk or tape systems.

Push the registers onto stack S to make a smooth return to Basic. Set a counter for the number of lines on the screen and send two control codes to the printer. The first is 31, which shifts it to the double-width mode. The second is 18, which sets the graphics mode.

Beginning with the first byte of the graphics memory (call it START), take a byte and shift 1 bit left to the carry flag. Rotate the carry flag into storage (call it STORE). Put the byte back into memory until 4 bits have been shifted. This approach reads only 4 vertical bytes at a time and inserts a zero between each new bit. The extra spaces and double-width mode permits a larger printout. Jump 32 bytes to get the first bit from the next byte down and do it again.

When STORE has 4 bits and three spaces, complement it. This changes all ones to zeros and all zeros to ones. Omit this command for a photographic negative effect. Set the high-order bit to alert the printer that it's graphic data. AND the register with

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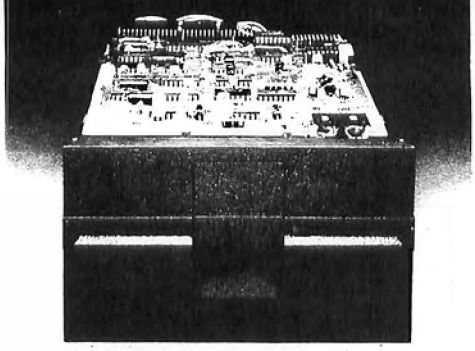

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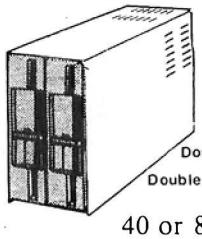

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&HD5 to reclear the spaces. The series of BIT tests checks to see if any spaces can be filled in to avoid a striped look in the final print. The program loops until one full line has been saved in the print buffer (PRTBUF). Each line is headed by the control codes 27,16,0, and 0 to tell the printer to begin at the left margin. Change the second zero to move the printing to the right on the page. When all printing is completed, exit by restoring the original registers from the stack. Send control code 30 to return the printer to text mode and RTS.

Assemble the source code using "A/IM/AO/WE" ("WE" to check for errors). Save the program with the appropriate format for tape (CSAVEM "SCRNDUMP",&H3E00,&H3EB3,&H3E00) or disk (SAVEM"SCRNDUMP/BIN",&H3E00,&H3EB3,&H3E00).

Using Screen Dump

Save a PMODE 4,1 or PMODE 3,1 graphics display to disk or tape, using the following addresses:

Tape—&H600,&H1DFF,0
Disk—&HE00,&H25FF,0

Next, type CLEAR 200,&H3DFF to keep Basic out of Screen Dump. Basic defaults to PCLEAR 4, which keeps it above the graphics pages.

LOADM"TITLE/BIN" (or CLOADM "TITLE") and then LOADM"SCRNDUMP/BIN" (or CLOADM"SCRNDUMP"). To watch the process occur, type PMODE4, 1:SCREEN1,1:EXEC&H3E00. You'll be able to see each line turn dark as it's stripped from the screen and reformatted for the printer. The text screen will reappear when printing is complete.

Using Basic

If you don't have an assembler, type in the Basic listing. You may run it as a stand-alone screen-dump program or save it as a machine-language program as shown above. Now, write Mom and let her see what great work you have been doing. ■

Address correspondence to R. Stephen Berry, Box 5396, Jacksonville, FL 32207.

Program Listing 2. Screen Dump, Basic Version →

```
10 CLEAR200,&H3DFF
20 FORX=&H3E00 TO &H3EB3
30 READ A
40 POKEX,A
50 NEXT X
60 EXEC&H3E00
70 END
80 DATA 52, 118, 134, 48, 183, 6
3, 180, 198, 254, 215
90 DATA 111, 48, 141, 0, 157, 16
6, 128, 129, 255, 39
100 DATA 6, 173, 159, 160, 2, 32
, 244, 142, 14, 0
110 DATA 52, 16, 51, 141, 0, 143
, 16, 142, 0, 8
120 DATA 198, 4, 127, 62, 171, 1
66, 132, 72, 118, 62
130 DATA 171, 116, 62, 171, 167,
 132, 48, 136, 32, 90
140 DATA 38, 239, 182, 62, 171,
67, 132, 213, 133, 64
150 DATA 39, 6, 133, 16, 39, 12,
 138, 32, 133, 16
160 DATA 39, 6, 133, 4, 39, 12,
138, 8, 133, 4
170 DATA 39, 6, 133, 1, 39, 2, 1
38, 2, 167, 192
180 DATA 17, 131, 63, 179, 44, 1
6, 53, 16, 52, 16
190 DATA 49, 63, 38, 182, 53, 16
, 48, 1, 52, 16
200 DATA 32, 170, 49, 141, 0, 49
, 166, 160, 173, 159
210 DATA 160, 2, 16, 140, 63, 17
9, 37, 244, 53, 16
220 DATA 48, 136, 97, 52, 16, 13
4, 10, 173, 159, 160
230 DATA 2, 122, 63, 180, 39, 2,
 32, 130, 53, 16
240 DATA 134, 30, 173, 159, 160,
 2, 15, 111, 53, 118
250 DATA 57, 0, 31, 18, 255, 27,
 16, 0, 0, 0
```


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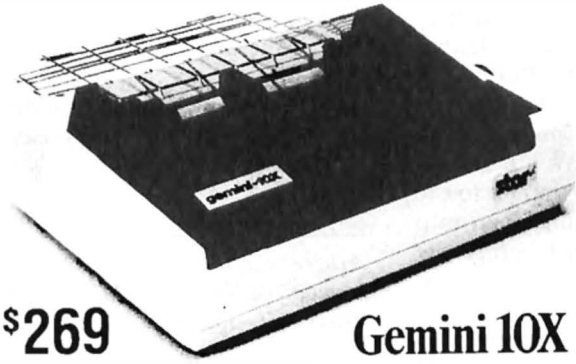

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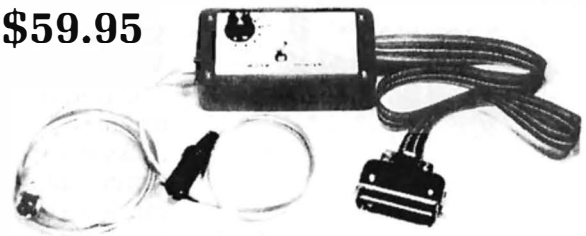

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BY MIKE MEEHAN

A Quick Fix For Your ROM

Your updated Disk Basic ROM and older software can speak to each other with this utility.

When you bought your CoCo 2 disk-drive controller, I'm sure you didn't expect that many of the disk software packages for the original CoCo would refuse to function correctly. The following program attempts to cure this problem by fixing machine-language disk programs so they will run on the new controller.

The program is written in Assembly and requires 16K Disk Extended Color Basic 1.1. The problem with the new controller lies in the ROM it uses. The new ROM contains the same routines as the old ROM, but the routines have been scrambled slightly. The fixer program simply looks through a machine-language program, finds a place in which a disk routine is called, and replaces the old address of that routine with the new address.

To accomplish this, I compiled a list of all the disk routines, documented and undocumented, that I could find and their old and new ROM addresses. I listed these addresses under the label TABLE. I placed a (1) beside the old address for a routine and followed this with an address with a (2) beside it. The (2) represents the address for the equivalent routine in the new ROM.

For example, you can see by looking at the table that if the program is searching and finds the command, JSR $D65B, it would change it to + JSR $D74E.

Unfortunately, this program can't account for all the programming tricks that programmers use, such as storing addresses in tables. Neither can it account for all the ROM routines. While I've made the table as complete as possible, I'm sure there are other routines I haven't discovered. You can add new routines to the table yourself by inserting them into the table at the end (just before the zeros) and reassembling the program.

In spite of these flaws, the fix program works for the large majority of programs I've tested it on. Once assembled, the program is easy to run. Simply load it and EXEC it. It asks you for a file name. Insert the disk containing the program you wish to fix into the disk drive and type the file name. There's no need to add the extension because the fixer program automatically adds "/BIN" to your file name. Your program is then loaded, fixed, and saved to the disk to replace the old file. You are then prompted for another file name. You can fix several programs in a row like this. To break out, you must turn the computer off and back on.

There are only two rules to follow while running this program: Never fix a program twice and *never* fix the fixer program itself.

The fixer program was written in Assembly because an equivalent Basic program might take several hours to fix some programs. Also, larger programs can be fixed with an Assembly program than with a Basic program.

I wrote the fixer program for the new controller and it works fine without any changes. Those users with old controllers should not attempt to run it because it could ruin the data on the disk in the drive.

Questions and comments are welcome. Please include a self-addressed, stamped envelope for responses. ■

Address correspondence to Mike Meehan, 1300 Fairfield Drive, Clearwater, FL 33546.

System Requirements
16K RAM
Disk Extended Color Basic 1.1

```
00100 *************************
00110 ****COCO2 DISK ROM FIX***
00120 *****BY: MIKE MEEHAN ****
00130 ******COPYRIGHT 1984*****
00140 *COLOR HORIZONS SOFTWARE*
00150 *************************
00160         ORG     $E00
00170 TABLE   FDB     $D65B   (1) ADDRESS
00180         FDB     $D74E   (2) CHANGE
00190         FDB     $D146   (1) TABLE
00200         FDB     $D233   (2)
00210         FDB     $D4AB   (1)
00220         FDB     $D599   (2)
00230         FDB     $D175   (1)
00240         FDB     $D262   (2)
00250         FDB     $D2CC   (1)
00260         FDB     $D3B9   (2)
00270         FDB     $D3FF   (1)
00280         FDB     $D4ED   (2)
00290         FDB     $D474   (1)
00300         FDB     $D562   (2)
00310         FDB     $D66C   (1)
00320         FDB     $D75F   (2)
00330         FDB     $D6C5   (1)
00340         FDB     $D7B8   (2)
00350         FDB     $C468   (1)
00360         FDB     $C48D   (2)
00370         FDB     $C6C5   (1)
00380         FDB     $C6F2   (2)
00390         FDB     $C8A4   (1)
00400         FDB     $C952   (2)
00410         FDB     $CA3B   (1)
00420         FDB     $CAE9   (2)
00430         FDB     $CA53   (1)
00440         FDB     $CB01   (2)
00450         FDB     $CEBC   (1)
00460         FDB     $CF68   (2)
00470         FDB     $CEE5   (1)
00480         FDB     $CFC1   (2)
00490         FDB     $D20E   (1)
00500         FDB     $D2FB   (2)
00510         FDB     $D1E5   (1)
00520         FDB     $D2D2   (2)
00530         FDB     $C201   (1)
00540         FDB     $C219   (2)
00550         FDB     $CD1A   (1)
00560         FDB     $CDF4   (2)
00570         FDB     $CDC0   (1)
00580         FDB     $CE9C   (2)
00590         FDB     $CD36   (1)
00600         FDB     $CE10   (2)
00610         FDB     $CD5B   (1)
00620         FDB     $CE37   (2)
00630         FDB     $CD28   (1)
00640         FDB     $CE02   (2)
00650         FDB     $CBCF   (1)
00660         FDB     $CCA9   (2)
00670         FDB     $CDE9   (1)
00680         FDB     $CDC5   (2)
00690         FDB     $CFE0   (1)
00700         FDB     $D0BC   (2)
00710         FDB     $D080   (1)
00720         FDB     $D15C   (2)
00730         FDB     $C99A   (1)
00740         FDB     $CA48   (2)
00750         FDB     $D026   (1)
00760         FDB     $D102   (2)
00770         FDB     $D025   (1)
00780         FDB     $D101   (2)
00790         FDB     $C98B   (1)
00800         FDB     $CA39   (2)
00810         FDB     $CF3F   (1)
00820         FDB     $D01B   (2)
00830         FDB     $C932   (1)
00840         FDB     $C9E0   (2)
00850         FDB     $CF8A   (1)
00860         FDB     $D066   (2)
00870         FDB     $D6DE   (1)
00880         FDB     $D7D1   (2)
00890         FDB     $D6FD   (1)
00900         FDB     $D7F0   (2)
00910         FDB     $D705   (1)
00920         FDB     $D7F8   (2)
00930         FDB     $D7A2   (1)
00940         FDB     $D895   (2)
00950         FDB     $D6D0   (1)
00960         FDB     $D7D0   (2)
00970         FDB     $D708   (1)
00980         FDB     $D7FB   (2)
00990         FDB     $D7AA   (1)
01000         FDB     $D89D   (2)
01010         FDB     $D7AE   (1)
01020         FDB     $D8A1   (2)
01030         FDB     $D7BC   (1)
01040         FDB     $D8AF   (2)
01050         FDB     $CEA2   (1)
01060         FDB     $CF7E   (2)
01070         FDB     $CF07   (1)
01080         FDB     $CFE3   (2)
01090         FDB     $CBD8   (1)
01100         FDB     $CCB2   (2)
01110         FDB     $C956   (1)
01120         FDB     $CA04   (2)
01130         FDB     $CB52   (1)
01140         FDB     $CC24   (2)
01150         FDB     $C297   (1)
01160         FDB     $C2AF   (2)
01170         FDB     $D5FF   (1)
01180         FDB     $D6F2   (2)
01190         FDB     $D23B   (1)
01200         FDB     $D328   (2)
01210         FDB     $D2CF   (1)
01220         FDB     $D3BC   (2)
01230         FDB     $C959   (1)
01240         FDB     $CA07   (2)
01250         FDB     $CCE2   (1)
01260         FDB     $CDBC   (2)
01270         FDB     $CF37   (1)
01280         FDB     $D013   (2)
01290         FDB     $C597   (1)
01300         FDB     $C5C4   (2)
01310         FDB     $C6C2   (1)
01320         FDB     $C6EF   (2)
01330         FDB     $C626   (1)
01340         FDB     $C653   (2)
01350         FDB     $C334   (1)
01360         FDB     $C352   (2)
01370         FDB     $C65F   (1)
01380         FDB     $C68C   (2)
01390         FDB     $C719   (1)
01400         FDB     $C744   (2)
01410         FDB     $CE02   (1)
01420         FDB     $CFDE   (2)
01430         FDB     $CEE9   (1)
01440         FDB     $CFC5   (2)
01450         FDB     $CBE9   (1)
01460         FDB     $CCC3   (2)
01470         FDB     $C618   (1)
01480         FDB     $C645   (2)
01490         FDB     $C601   (1)
01500         FDB     $C62E   (2)
01510         FDB     $D6FF   (1)
01520         FDB     $D7F2   (2)
01530         FDB     $C714   (1)
01540         FDB     $C744   (2)
01550         FDB     $CCBE   (1)
01560         FDB     $CD98   (2)
01570         FDB     $CC4F   (1)
01580         FDB     $CD29   (2)
01590         FDB     $CCF6   (1)
01600         FDB     $CDD0   (2)
01610         FDB     $CC7F   (1)
01620         FDB     $CD59   (2)
01630         FDB     $CCCC   (1)
01640         FDB     $CDA6   (2)
01650         FDB     $CCDC   (1)
01660         FDB     $CDB6   (2)
01670         FDB     $CC35   (1)
01680         FDB     $CD0F   (2)
01690         FDB     $CCB6   (1)
01700         FDB     $CD90   (2)
01710         FDB     $CC86   (1)
01720         FDB     $CD60   (2)
01730         FDB     $CC8E   (1)
01740         FDB     $CD68   (2)
01750         FDB     $CC10   (1)
01760         FDB     $CCEA   (2)
01770         FDB     $C608   (1)
01780         FDB     $C635   (2)
01790         FDB     $D547   (1)
01800         FDB     $D634   (2)
01810         FDB     $D5A7   (1)
01820         FDB     $D694   (2)
01830         FDB     $C0D2   (1)
01840         FDB     $C0E5   (2)
01850         FDB     $00     (1)
01860         FDB     $00     (2)
01870 BIN     FCC     "BIN"
01880 START   LDX     #END    START PROGRAM
01890         LDA     #232
01900 LOOP1   STA     ,X+
01910         CMPX    #$8000
01920         BNE     LOOP1
01930         LBSR    SETUP
01940         LDB     #1      ASK PROGRAM
01950         LDX     #FI     NAME
01960         LBSR    PRINT
01970         LDX     #$50B
01980 LOOP2   STX     $88
01990         JSR     $A1B1
02000         CMPA    #$0D
02010         BEQ     LOOP6
02020         CMPA    #$8
02030         BEQ     LOOP4
02040         CMPA    #$15
02050         BEQ     LOOP5
02060         CMPX    #$513
02070         BEQ     LOOP2
02080         CMPA    #$40
02090         BLO     LOOP3
02100         SUBA    #$40
02110 LOOP3   STA     ,X+
02120         BRA     LOOP2
02130 LOOP4   LDA     #$20
02140         CMPX    #$50B
02150         BEQ     LOOP2
02160         STA     ,X
02170         LEAX    -1,X
02180         BRA     LOOP2
02190 LOOP5   LDA     #$20
02200         CMPX    #$50B
02210         BEQ     LOOP2
02220         STA     ,X
02230         LEAX    -1,X
02240         BRA     LOOP5
02250 LOOP6   LDA     #$20
02260         STA     ,X
02270         LDX     #$94C
02280         LDY     #$50B
02290         LDB     #8
02300 LOOP7   LDA     ,Y+
02310         CMPA    #$1A
02320         BHS     LOOP8
02330         ADDA    #$40
02340 LOOP8   STA     ,X+
02350         DECB
02360         BNE     LOOP7
02370         PSHS    X       LOAD PROGRAM
02380         LBSR    SETUP
02390         LDB     #1
02400         LDX     #LO
02410         LBSR    PRINT
02420         PULS    X
02430 LOOP9   LDY     #BIN
02440         LDA     #3
02450 LOOP10  LDB     ,Y+
02460         STB     ,X+
02470         DBCA
02480         BNE     LOOP10
02490         LDA     #$49
02500         LDX     #$1FF
02510         STX     $957
02520         LDX     #$100
02530         STX     $97C
02540         LDB     #1
02550         STB     $6F
02560         JSR     $C48D
02570         LDD     #END
02580         SUBD    $AA6
02590         STD     $D3
02600         LDD     $AA6
02610         STD     BADD
02620         JSR     $CFE3
02630         LBSR    SETUP
02640         LDB     #1
02650         LDX     #FIXX
02660         LBSR    PRINT
02670         LDX     #END
02680 LOOP11  LDA     ,X+
02690         CMPA    #232
02700         BNE     LOOP11
02710         CMPX    #$7FF0
02720         BHS     LOOP12
02730         LDA     1,X
02740         CMPA    #232
02750         BNE     LOOP11
02760         LDA     2,X
02770         CMPA    #232
02780         BNE     LOOP11
02790         LDA     3,X
02800         CMPA    #232
02810         BNE     LOOP11
02820         LDA     4,X
02830         CMPA    #232
02840         BNE     LOOP11
02850 LOOP12  STX     EADD
02860 FIX     LDD     #END-1  ROUTINE TO
02870         TFR     D,Y     FIX PROGRAM
02880 LOOP13  LDX     #TABLE  IN MEMORY
02890         LEAY    1,Y
02900         CMPY    EADD
02910         BEQ     LOOP17
02920 LOOP14  LDD     ,Y
02930         CMPD    ,X++
02940         BNE     LOOP16
02950         LDA     -1,Y
02960         CMPA    #$8E
02970         BEQ     LOOP15
02980         CMPA    #$7E
02990         BEQ     LOOP15
03000         CMPA    #$BD
03010         BNE     LOOP16
03020 LOOP15  LDD     ,X
03030         STD     ,Y
03040         BRA     LOOP13
```

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```
03050 LOOP16  LEAX    2,X
03060         LDA     ,X
03070         CMPA    #00
03080         BEQ     LOOP13
03090         BRA     LOOP14
03100 LOOP17  BSR     SETUP
03110         LDB     #1
03120         LDX     #SA
03130         BSR     PRINT
03140 SAVE    LEAS    -6,S    SAVE FIXED
03150         LDX     EADD    PROGRAM
03160         LEAX    -1,X
03170         STX     2,S
03180         LDX     #END
03190         STX     4,S
03200         LDD     157
03210         SUBD    #END
03220         ADDD    BADD
03230         STD     0,S
03240         LDX     #$200
03250         STX     $957
03260         JSR     $CA04
03270         CLRA
03280 LOOP18  BSR     LOOP22
03290         LDD     2,S
03300         SUBD    4,S
03310         TFR     D,Y
03320         BSR     LOOP21
03330         LDD     BADD
03340         BSR     LOOP21
03350 LOOP19  LDX     #END
03360 LOOP20  LDA     ,X+
03370         JSR     $CC24
03380         LEAY    -1,Y
03390         BNE     LOOP20
03400         LDA     #$FF
03410         BSR     LOOP22
03420         CLRA
03430         CLRB
03440         BSR     LOOP21
03450         PULS    A,B,X,Y
03460         BSR     LOOP21
03470         CLRA
03480         CLRB
03490         JSR     $A42D
03500         JMP     START
03510 LOOP21  BSR     LOOP22
03520 LOOP22  JSR     $CC24
03530         EXG     A,B
03540         RTS
03550 SETUP   LDX     #$400   CLEAR
03560         LDA     #$20    SCREEN
03570 LOOP23  STA     ,X+
03580         CMPX    #$601
03590         BNE     LOOP23
03600         LDA     #8      CHANGE TO
03610         STA     $FF22   DARK SCREEN
03620         LDB     #4      PRINT TITLE
03630         LDX     #TITLE
03640 PRINT   LDY     ,X++    PRINT ON
03650 LOOP24  LDA     ,X+     SCREEN DATA
03660         BEQ     LOOP26  STORED AT X
03670         CMPA    #$40
03680         BLO     LOOP25
03690         SUBA    #$40    INVERT LETTER
03700 LOOP25  STA     ,Y+
03710         BRA     LOOP24
03720 LOOP26  DECB            ANOTHER LINE?
03730         BNE     PRINT   LINE?
03740         RTS
03750 TITLE   FDB     $407    DATA FOR TITLE
03760         FCC     /COCO2 DISK ROM FIX/
03770         FCB     $00
03780         FDB     $428
03790         FCC     /BY: MIKE MEEHAN/
03800         FCB     $00
03810         FDB     $449
03820         FCC     /COPYRIGHT 1984/
03830         FCB     $00
03840         FDB     $464
03850         FCC     /COLOR HORIZONS SOFTWARE/
03860         FCB     $00
03870 FI      FDB     $502
03880         FCC     /FILENAME?/
03890         FCB     $00
03900 LO      FDB     $50C
03910         FCC     /LOADING/
03920         FCB     $00
03930 SA      FDB     $50C
03940         FCC     /SAVING/
03950         FCB     $00
03960 FIX     FDB     $50C
03970         FCC     /FIXING/
03980         FCB     $00
03990 BADD    NOP             BEGINNING
04000         NOP             ADDRESS
04010 EADD    NOP             ENDING
04020         NOP             ADDRESS
04030 END     NOP             BEGINNING OF PROGRAM
04040         END     START
```

End

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- M-RUN
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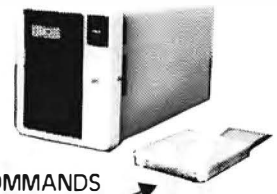

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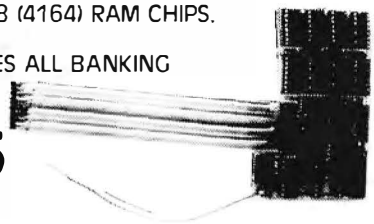

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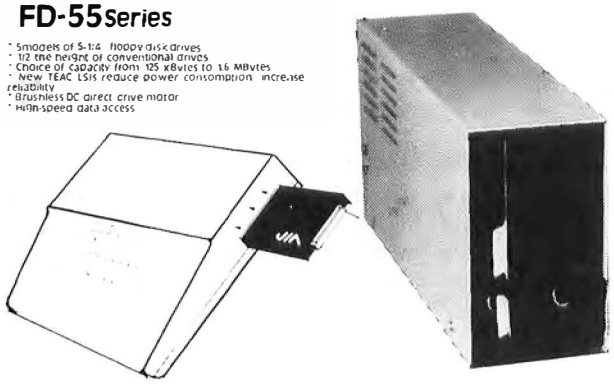

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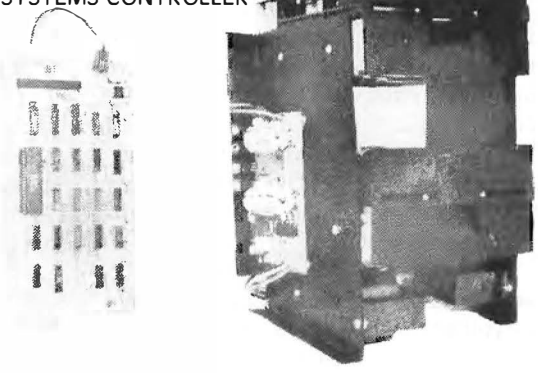

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Circle Reader Service card #185

HOT CoCo's Worldwide User's Group List

by the **HOT CoCo** *Staff*

To some people, owning a Color Computer is a learning experience. For others it is a form of recreation. Still others use CoCos in business or a profession. All these people can benefit from being members of a user's group.

The term "user's group" is really computerese for "computer club". In fact, many organizations call themselves clubs. All the organizations here, though, have the same goal regardless of what they call themselves: They want to help you get the most out of your Color Computer.

Many offer programming classes or make available libraries of public-domain software to members. Others have arrangements with vendors for discounts on commercial software and hardware. And you can always get advice on where to get the best deal on a printer, or an opinion on which word processor is best.

Meeting regularly with people who are as enthusiastic about their computers as you are with yours is also just plain fun. Some clubs plan social events in addition to regular meetings, which makes for some closely knit groups.

Ideas, advice, discounts on software, and fun—this is what user's groups are all about. And this list will help you find one close to you.

About the List

Our user's group list is organized by state and country. We have used standard two-letter abbreviations for each state, but we assigned arbitrary abbreviations for several countries. Table 1 explains all the abbreviations used in this list.

We have divided this list into two parts: those exclusively for Color Computer users and those that accept users of CoCos and other makes of computers as well. We have further divided each part according to whether or not dues are charged. Generally, a club that charges dues is able to offer more to its members, usually in the form of a newsletter that not only informs members of club activities, but might also include type-in program listings or reviews of software and hardware.

HOT CoCo Club Rate

Another bonus to belonging to a user's group is that *HOT CoCo* offers a special rate to group members. The standard club rate is $21.97 for a year's subscription—a $3 savings. Higher discounts are available for large orders. Interested club members should write to **Debbie Walsh, Circulation Department, *HOT CoCo*, 80 Pine St., Peterborough, NH 03458** for club-rate subscription cards or more information on the large-order discounts.

New Clubs and Updates

We have made every effort to provide an up-to-date list. However, clubs often change mailing addresses and phone numbers with a change of officers, and new clubs are being formed every day. We announce these changes and additions regularly in the Clubs section of *HOT CoCo*'s Letters to the Editor column. If your club listing is incorrect or you want to announce a club not listed here, drop us a line. We would be happy to publish it in the next available issue.■

AL Alabama	KS Kansas	OK Oklahoma
AU Australia	KY Kentucky	OR Oregon
AZ Arizona	LA Louisiana	PA Pennsylvania
CA California	MA Massachusetts	RI Rhode Island
CD Canada	MD Maryland	SC South Carolina
CO Colorado	MI Michigan	TN Tennessee
CT Connecticut	MO Missouri	TX Texas
FL Florida	MX Mexico	UG User's Group
GA Georgia	NC Noth Carolina	UK United Kingdom
HI Hawaii	ND North Dakota	UT Utah
HO Holland	NJ New Jersey	VA Virginia
IA Iowa	NM New Mexico	WA Washington
IL Illinois	NY New York	WI Wisconsin
IN Indiana	OH Ohio	WV West Virginia

Table 1. Abbreviations Used in the User's Group List

CoCo-Only Groups - Dues Charged

State or Country	Group Name	Address	City	Zip	Members	Phone Number	Contact Person
AL	Huntsville Color-80 User's Group	10111 Versailles Drive	Huntsville	35803	25	205-882-2485	Randy Niemann
AU	Blacktown City Colour Computer UG	27 Alford St.	Blacktown, NSW	2148	30	026269936	Keith Gallagher
AU	Brisbane North User's Group	64 Noble St. Clayfield	Brisbane, Qld	4011	20	07-262-8869	Jack Fricker
AU	The Color Computer Club	3 Daisy St.	Newton. Geelong	3220	81	052-21-4749	Lionel Cowley
AZ	Pheonix Color Computer Club	6619 West Palo Verde Ave.	Glendale	85302	48	602-939-5666	MIke Huffman
AZ	Tucson Color Computer Club	6857 A Lightning Cir. #22	Tucson	85708	95	602-790-4353	William H. Nunn
BE	HCC TRS-80 CoCo	Ruytenburgster 74	2600 Berchem		50		Peersman G
CA	Color America	2227 Canyon Road	Arcadia	91006	75	213-355-6111	Mark Randall
CA	Silicon Valley Color Computer Club	P.O. Box 61593	Sunnyvale	94088	98		Glen Eric Montgome
CA	L.A. Wilshire Color Computer UG	269 S. Lafayette Park Pl.	Los Angeles	90057	20	213-389-3334	Norm Wolfe
CA	Citrus Color Computer Club	P.O. Box 6991	San Bernardino	92412	12	714-887-9794	Terry Steen
CD	Vancouver Color Computer Club	3167 East 3rd Ave.	Vancouver, BC	V5M 1G3	60	255-4093	Ronn O'Conner
CD	K-W Color Computer Club	23 Hudson Circle	Kitchener, Ont.	N2B 2V7	80		Peter Karwowski
CD	Regina Color Computer Club	26 Tweedmuir Bay	Regina, SK	S4X 2B1	50	306-949-3942	George Glass
CD	Toronto Colour Computer Club	54 Kerr Road	Toronto, Ont.	M4L 1K5	40		Patricia Jackson
CD	Halifax-Dartmouth CoCo User's Group	P.O. Box 572	Dartmouth, N.S.	B2Y 3Y9	50	902-469-3656	Roger Pocklington
CD	Calgary Color Computer Club	151 Whitelock Place N.E.	Calgary, Albert	T1Y 4S7	39		D. Baily
CD	Niagara Regional CoCo Club	7707 Jubilee Drive	Niagara Fls.Ont	L2G 7J3	96	416-357-3462	Gerry Chamberland
CD	North Island CoCo Club	P.O. Box 1740	Port Hardy, BC	V0N 2P0	30	604-949-6761	Ann-Marie MacKay
CD	Color Computer Moncton UG (COCOMUG)	91 Woodland Drive	Moncton, NB	E1E 3C4	25	506-382-2190	Leo Allain
CD	London CoCoNuts	36 Nottinghill Crescent	London, Ontario	N6K 1R1	74	519-471-1345	Mark Watts
CD	Meadowvale Color Computer Club	P.O. Box 186	Streetsville,ON	L5M 2B8	26		Howard Porter
CD	Saskatoon Color Computer Club	Box 146, R.R. 2	Saskatoon, Sask	S7K 3J5	33		Harold Balitski
CO	Colorado Color Computer Club	P.O. Box 3492	Northglenn	80233	68	303-650-9768	Joe Applegate
FL	The Color Computer Club of Sarasota	4047 Bee Ridge Road	Sarasota	33582	100	813-921-7510	Ernie Bontrager
FL	Jacksonville Color Computer Club	2411 Hirsch Ave.	Jacksonville	32216	55	904-721-0282	Bill Brown
FL	Dade Color User's Group	P.O. Box 651385	Miami	33173	93		John Lovell
FL	Alachua County Color Computer UG	Rt. 2, Box 530	Alachua	32615	37	904-462-5392	George McDonald
FL	CoCo Chips Color Computer Club	6 Belle Meade Circle	Largo	33540	25	813-581-7779	Linda Signor
IA	Color Computer Club	325 North Dubuque	Iowa City	52240	8	319-337-6094	Steve Roberts
IL	Peoria Color Computer Club	38 La Kemper Drive	Metamora	61548	28	309-383-4312	Larry Parker
IL	CoCo Cups	RRT. 2	Creal Springs	62922	42	618-996-2697	Charles Thome
IN	Co*Co*M*U*G	3635 North 300 East	Marion	46952	16	317-662-7887	John A. Helwig
KS	Topeka Color Computer User's Group	2224 Hope	Topeka	66614	21	913-272-1353	Kevin Cronister
KS	The Color Computer Club	C/O Rivco 1205 N. Mosley	Wichita	67214	73	316-755-1314	Rex Rivers
KY	The Radcliff Color Computer Club	287 Highland Dr.	Radcliff	40106	20		Bryan Harp
KY	THE LOCO-COCO	3141 Doreen Way	Louisville	40220	65	502-458-6690	Mike Standefer
LA	Cajun CoCo Club	104 Karen St.	New Iberia	70560	80	318-365-7706	Bob Hoevel
MA	NECCUG	R.D. 2, Box 261	Harvard	01451	100	617-456-8291	Chris Sweet
MA	6809'ers	93 Grochmal Ave. #90	Springfield	01151	35	413-732-6633	Paris Nepus
MA	Greater Boston Super Color UG	6 Boulder Drive	Burlington	01803	85	617-433-5689	Bob Biamonte
MA	Framingham Color Computer Club	43 Fox Hill Road	Framingham	01701	30	617-879-0570	Mitch Cohen
MI	Michiana Color Computer Club	310 S. Jefferson St.	Sturgis	49091			Clay Howe
MI	Color C.H.I.P.S.	586 Eastridge	Ortonville	48462	75	313-627-2235	Julie Hallock
MI	Petoskey Area CC Club (PAC3)	670 Liegl Drive	Alanson	49706	14	616-347-0607	Dennis Hoshield
MN	Twin Cities Color Computer UG	3001 Kyle Ave. N.	Golden Valley	55422	85	612-735-1358	Bob Rutledge
MO	CoCoNuts	1610 N. Marlin	Springfield	65803	21	417-485-3419	Steve Knittel
ND	Elite Software User's Group	Box 683	West Fargo	58078	300	701-281-0549	John Steiner
NJ	Garden State Color Computer UG	5 North 20th Ave.	Manville	08835		201-725-5028	Darren Nye
NM	NM Computer Soc. Spcl Int. CC UG	146 Wisconsin SE	Albuquerque	87107	20	293-8567	Steve Maggs
NY	Broome CoCo Club	57 Front St.	Binghamton	13905	35	607-723-8223	Bucky Helmer
NY	Local CoCo	P.O. Box 901	Bellmore	11710	15	516-783-7506	Joe Castelli
NY	CoCo Phile Society of Syracuse	5856 Ira Dixon Road	Camillus	13031	50	315-672-3694	Daniel Button
OH	Color Computer Club	P.O. Box 478	Canfield	44406	120	216-782-6764	Larry Cadman
OH	Columbus and Central Ohio CoCo Club	19 E.N. Broadway	Columbus	43214	124	614-268-5366	Don Sparrow
OH	Radio Shack Color Computer UG	527 Malvern Drive	Painesville	44077	35		Anthony Ruque
PA	Penn-Jersey Color Computer Club	P.O. Box 2742	Lehigh Valley	18001	55		Jerry Behler
PA	6809's Computer Club	114 Kenneth Drive	Delmont	15626	19	412-463-5498	William A. Walker
RI	New England CoConuts	38 Cooke St.	Providence	02906	110	401-521-2626	Andy Nulman
SC	Metropolitan Greenville CoCo Club	P.O. Box 6	Gray Court	29645	50	803-967-8851	David Dewease
SC	Invitational Software Group	3562 Linbrook Drive	Columbia	29223	55	803-786-0541	Tom Reed
TN	Memphis CoCo Users	4903 Warrington RD.	Memphis	38118	75	901-362-5945	Ben Barton
TN	Memphis Color Computer User's Group	3422 Plaza Ave.	Memphis	38111	65	615-323-1183	Arnie Graber
TX	Color Basic User's Group (CBUG)	P.O. Box 634	Big Sandy	75755	20	214-636-4129	William Arnold Byr
TX	Wizard's Computer Club	704 Baltimore	Hereford	79045	15	806-364-6204	Russell Brownlow
VA	Northern VA Color Computer Club	P.O. Box 1614	Manassas	22110	31	703-820-0658	Logan McMinn
VA	Richmond Color Computer UG	2115 Buford Road	Richmond	23235	30	804-320-0019	R.W. Graham

continued

continued

WA	Northwest Color Computer Club	P.O. Box 4533	Spokane	99202	11	509-928-5883	Tim Watson
WI	CoCo-Mug	2420 Misty Lane	Waukesha	53186	100	414-542-0600	Tom Fandre
WI	Pro-Color-File National UG	12851 W. Balboa Drive	New Berlin	53151	100	414-425-8810	Jorge Mir

CoCo-Only Groups - No Dues Charged

State or Country	Group Name	Address	City	Zip	Members	Phone Number	Contact Person
AU	Brisbane West User's Group	17 Penley St, The Gap	Brisbane, Qld	4061	80	07-30-2072	Brian Dougan
AZ	CoCo User's Group	218 West Calle Margarita	Tucson	85706	50	602-889-82544	Steve Parkman
CA	Color Computer/Bakersfield UG	2521 Bishop Apt. A	Bakersfield	93306	7	805-872-8618	Larry Sheridan
CO	Lowry AFB Micro Club/ CoCo UG	2249 Moline Street	Aurora	80010	47	303-343-3473	Jerry Surrite
IL	Northern IL Color Computer Clubb	9346 Landings Square	Des Plains	60187	115	312-824-1291	Kevin O'Brien
IN	Indy Color Computer Club	P.O. Box 68702	Indianapolis	46268	60	317-257-3300	Mike Davis
IN	Evansville CoCo User's Group	P.O. Box 462	Poseyville	47633	9	812-874-2210	Brian Boyles
MX	Mexico City Color Computer Club	Laja #230,01900,Mexico DF	Mexico City		25	568-78-75	Marcelo Luft
NC	Raleigh Color Computer Club	P.O. Box 681	Garner	27529	132		David Roper
NC	Greater Wilmington CC User's Group	115 Dellwood Drive	Wilmington	28405	21	919-791-5829	Bob Owen
ND	CoCo User's Group	Box 683	West Fargo	58078	15	701-281-0549	John Steiner
NY	Adirondack Color Computer Club	Box 365	Bolton Landing	12814	20	518-644-9927	Bill Edwards
OH	Northern Ohio Color Computer Users	307 West Maple St.	Clyde	43410	43	419-547-9876	Daryl G. Wing
OH	Dayton CoCo User's Group	609 Applehill Dr.	West Carrollton	45449	48	513-859-3529	Joseph P. Evans
OK	East Oklahoma Color Computer Club	P.O. Box 326	Tulsa	74966	5		Doug Moller
OR	Central Oregon Color Computer Club	3947 NW 21st	Redmond	97756	12	503-548-3292	Paul Bellemore
PA	Color Computer User's Group	1901 J.F. Kennedy Blvd.	Philadelphia	19103	40	215-567-4276	Arnold Weiss
PA	Hug-A-CoCo (Harrisburg User's Group	2012 Mill Plain Court	Harrisburg	17110	30	717-657-2789	George Lurie
PA	Westmoreland Area CC Operators Club	RD #1, Box240 AA	New Stanton	15672	18	412-925-1914	David Chess
TX	CoCo Club of Austin Texas	1809 Dexter	Austin	78704	12	512-442-6317	David Karam
UT	Ogden CoCo	4535 South 2600 West	Roy	84067	53	801-731-6789	Kathy Rush
WA	SEA-TAC CoCo Club	1851 S. Central Place	Kent	98031	70	206-854-7072	Michael D. Nugent
WI	So. Wisconsin Color Computer Club	829 Hickory Road	Twin Lakes	53181	30	414-877-3988	David C. Buehn
WV	West Virginia Color Computer Club	949 Baier St.	St. Albans	25177	30	304-727-6764	William W. Mucklow

General Groups - Dues Charged

State or Country	Group Name	Address	City	Zip	Members	Phone Number	Contact Person
AL	G2C3	4307 Old Shell Road	Mobile	36608	60		Gerald T. Regan
AL	Central Alabama Micro Society Inc.	P.O. Box 17021	Montgomery	36117	75	205-272-5069	
AU	Adelaide Micro User's Group	36 Sturt St.	Adelaide	5000	225	337-6682	R. Stevenson
AZ	Dust Byters User's Group	6557-A East Calle La Paz	Tucson	85715	40	602-889-8244	Burt Haberman
AZ	Arizona Computer Society	P.O. Box 15623	Pheonix	85060	20		
CA	Forth Interest Group	P.O. Box 1105	San Carlos	94070	3500	415-962-8653	William Ragsdale
CA	Soland Micro Computer User's Group	550 Marigold	Fairfield	94533	75	707-422-3417	David A. Irwin
CA	San Gabriel Valley TRS-80 User's	750 East 5th St. #75	Azusa	91702	150	213-969-3605	Dan Dresselhaus
CA	S. CA. Amateur Radio Comp. Club	962 Cheyenne	Costa Mesa	92626	150	714-549-8516	Fried Heyn
CA	San Diego TRS-80 User's Group	P.O. Box 17109	San Diego	92117	70	619-565-4947	Warren McKenna
CD	Toronto Microcomputer User's Group	P.O. Box 875 Postal St. A	Toronto,Ont.	M5W 1G3	100		
CD	Vancouver TRS-80 User's Group	#805-1985 Woodway Pl.	Burnaby, BC	V5B 4T4	40	733-2558	Stan Talaczyk
CD	Micro-80 Computer Club of Ottawa	178 Monterey Drive	Nepean, Ont.	K2H 7A8	160	613-820-2170	Robert J. Whitla
CD	Regina Operaters of Microcomputers	Box 1001	Regina, SK. .	S4P 3B2	54	522-8808	R.W. Moffat
CD	Winnipeg Micro 80 User's Group	17 Bittersweet	Winnipeg, Man.	R2J 2E5	90	452-5978	Don Wood
CD	International Adventure User Group	84 Camberley Crescent	Brampton, Ont.	L6V 3L4	23	416-451-9452	M. Dow
CO	Southern Colorado Computer Club	1635 South Prairie Ave.	Pueblo	81005	120	303-564-3545	Lloyd Armstrong
CT	Connecticut Computer Society,Inc	1199 Farmington Ave.	West Hartford	06107	220	203-561-3659	Bruce Brown
CT	Procomp Computer Club	Dept. 7, 844 Vernon ST.	Manchester	06040	200	203-643-4072	Paul Monaco
CT	Fairfield County Computer UG Inc.	10 Richlee Road.	Norwalk	06851	150	203-866-7883	Alan Abrahmson
CT	TRS-80 UG of Central Connecticut	P.O. Box 1575	Hartford	06114	130		Henry H. Hunt
FL	Central Florida Computer Society	P.O. Box 8019	Maitland	32751	50	305-862-1329	Bill Wellman
FL	Tampa Bay TRS-80 User Group	1721 Greenlee Drive	Clearwater	32751	120		Tom Stiles
FL	Jacksonville Area Computer Society	#202 7350 Blanding Blvd.	Jacksonville	32210	73	904-772-6418	Mel Scarberry
FL	Marion County Computer Society	POB 248, 2950 NE 55th Ave	Silver Springs	32688	45	904-629-8060	Roy Kahkonen
FL	Tallahassee Area Computer Society	P.O. Box 6716	Tallahassee	32314	100		
FL	Space Coast Microcomputing Club	315 Inlet Ave.	Merrit Island	32953	200		Ray O. Lockwood
GA	CSRA Computer Society	P.O. Box 784	Augusta	30903	50	404-733-1232	Steve Larson
HO	TRS-80 Gebruikers Vereniging Benelu	P.O. Box 551, 2070 An	Santpoort-Noord		2300	31 23 384135	G. Zuiderduyn
IL	Chicago Area Comp. Hobbyists Exch.	323 S.Franklin,804,PO 176	Chicago	60611	50	312-935-6809	

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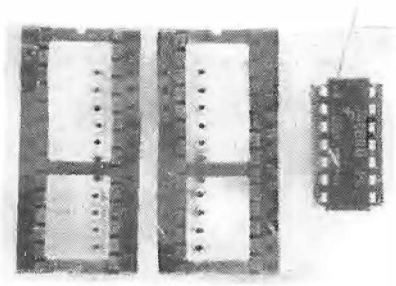

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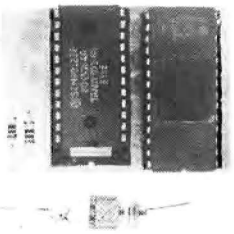

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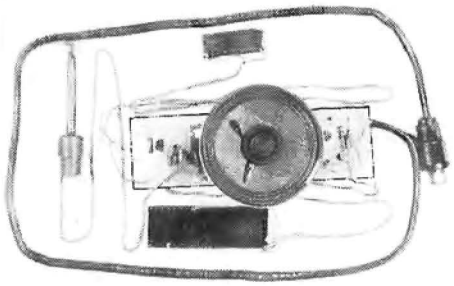

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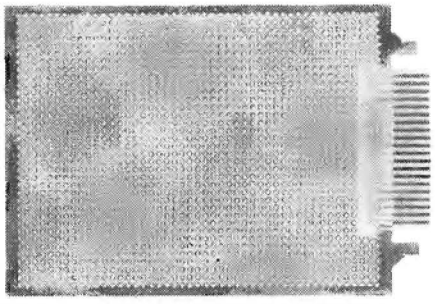

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Circle Reader Service card #185

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IL	Motorola Microcomputer Club	1301 E. Algonquin Road	Schaumburg	60196	200+	312-576-3044	Steve Adler
IL	Southern Illinois Computer Klub	2815 Orchid Court	Highland	62249	25		John Dalhaus
IL	Central Illinois TRS-80 Comp. Club	1836 So. Pasfield	Springfield	62704	102	217-523-2764	Larry Sandhaas
IN	Northeast Computer Club	P.O. Box 50252	Indianapolis	46250	140	317-849-8149	
MA	The Boston Computer Society	Three Center Plaza	Boston	02108	7000	617-367-8080	Sunny Tarby
MA	TRUGEM	61 Lake Shore RD.	Natick	01760	60	617-443-3327	Mathew W. Slate
MD	TBUG	102 N. Collington Ave.	Baltimore	21231	50	301-338-7568	J.E. Spath
MI	Kalamazoo Area Computer Assn.	1927 Winchell Ave.	Kalamazoo	49008	20	616-327-2210	Jim Johnston
MI	CMTUG INC.	410 Liberty St.	Lansing	48926	50	517-482-2294	Dennis Hill
MI	Computer Shack	1691 Easen	Pontiac	48054	100	313-673-8700	Gordon Monnieri
MI	The Plutonian Society	8191 Woodland Shore #12	Brighton	48116	100		Kazys Varnellis
MO	North County 80 Users Group	#12 Ville Donna Court	Hazelwood	63042	195	314-739-4078	Tom Vogel
MO	Kansas City TRS-80 User's Group	300 N.W. 83rd St.	Kansas City	64118	70		Mary Youngblood
MO	St. Louis Computer Group	5600 Clayton Road	St. Louis	63110	300		
NC	Triad Amateur Computer Society	Box 7073	Greensboro	27417	195	919-299-0708	Kenn Melton
NC	TRS-80 Users Group of Charlotte	6613 Summerlin Plaza	Charlotte	28226	157	704-542-9959	Bill Hardin
NJ	TRS-80 UG of Monmouth County	2 Briar Mills Drive	Bricktown	08723	50	201-458-5169	Ed Newman
NJ	Home Computing Newsletter	1371 White Oak Bottom Rd.	Toms River	08753	3		Mickey Jsol$os
NJ	Amateur Computer Club of NJ	Box 319	So. Bound Brook	08880	1,400	201-246-3749	Mark Sproul
NY	Kings Byte Inc.	1063 East 84 ST.	Brooklyn	11236	80	212-763-4233	Morty Libowitz
NY	TRS-80 User's Group	244 Mill Road	Yaphank	11980	1800	516-924-9229	V. Edwardson
NY	Rochester S-80 Computer Club Inc.	P.O. Box 15476	Rochester	14615	133		Nabeel Al Salom
NY	User's Group	245 Mapleview Road	Cheetowaga	14225	88	716-832-0778	Dr. R.E. Pontera
NY	Metro TRS-80 User's Group	310 West 106th St.-15D	New York	10025	40	212-222-8751	George Mueden
OH	North Central Ohio computer Society	P.O. Box 965	Mansfield	44901	40		
OH	JC TRS-80 ACSCO	Box 28355	Columbus	43228	120	614-267-0554	Bill M.
OK	Tulsa Computer Society	P.O. Box 1133	Tulsa	74101	450	918-743-6831	Ray Mclain
OK	Southern Lawton User's Group	P.O. Box 246	Geronimo	73543	44		Dan Goddard
OR	Micro-80 Group, TRS-80 Users	P.O. Box 1472	Eugene	97440	55	503-688-5847	Bob Walters
OR	Milwaukie TRS-80 User Group	3520 S.E. Vineyard Road	Milwaukee	97222	25	503-659-8842	Jim Clayton
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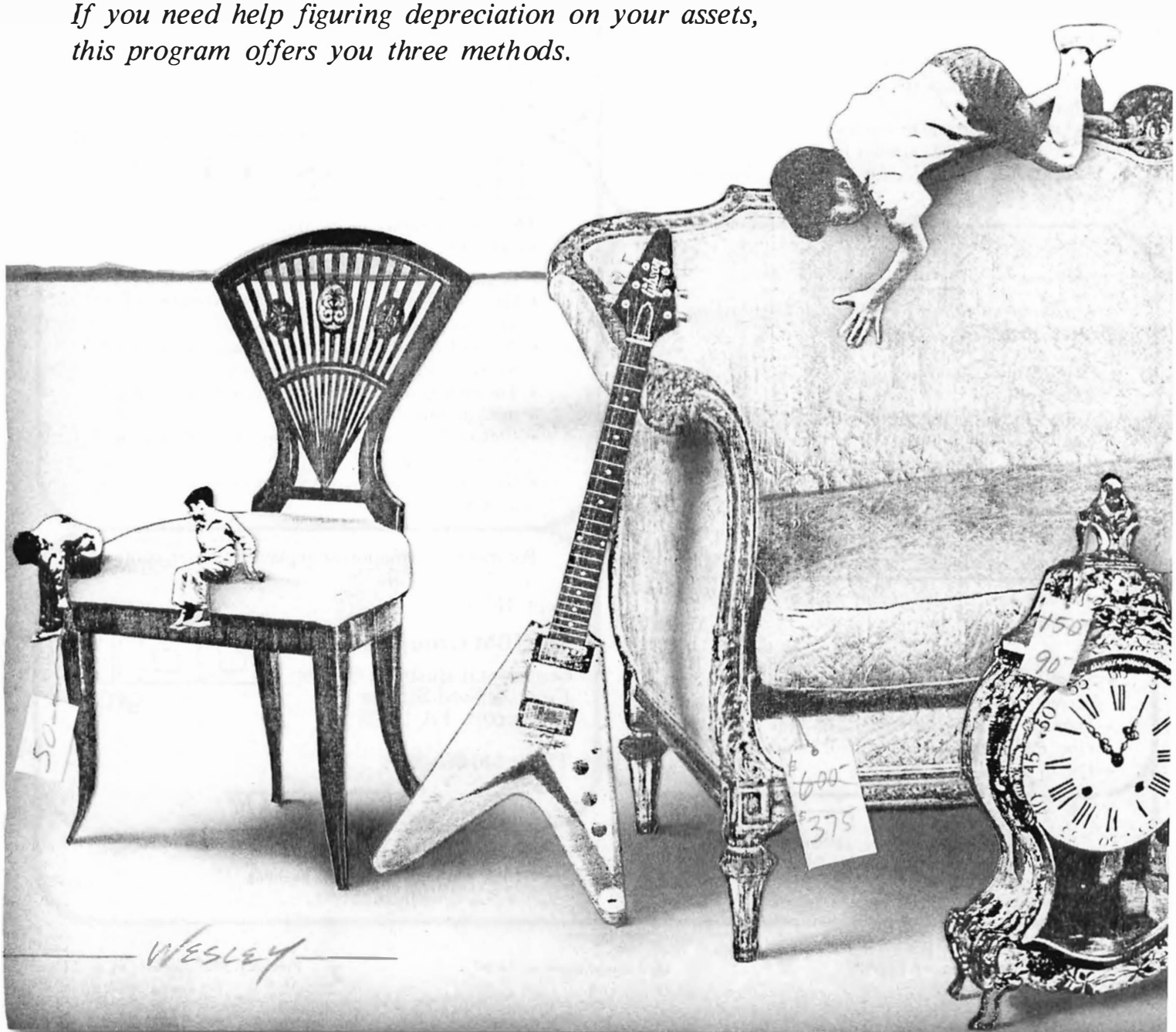
BY ROD WEISS

Where Does The Value Go?

If you need help figuring depreciation on your assets, this program offers you three methods.



This program is available on our Instant CoCo cassette.
See the Instant CoCo ad elsewhere in this issue.

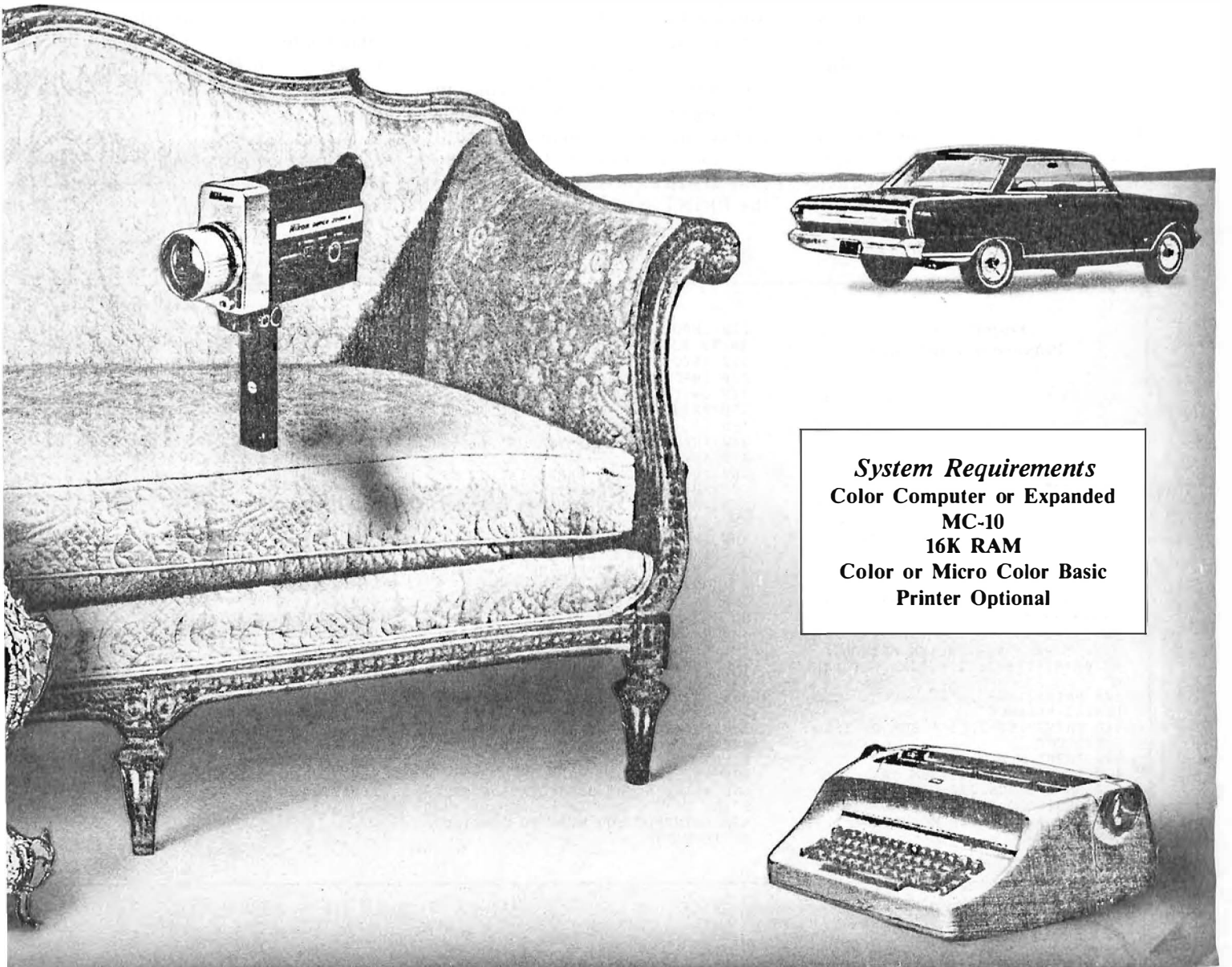
If you purchased a new car five years ago, the moment you drove it off the lot, it depreciated $1,200. Today, it loses approximately $3,000 in value.

Cars, counters, scales, furniture, computers, permanent fixtures, buildings—almost all the items you use in a business (except pencils and paper)—are depreciable. This program is designed for the novice bookkeeper, businessman, and computer owner to figure depreciation using a 16K CoCo computer.

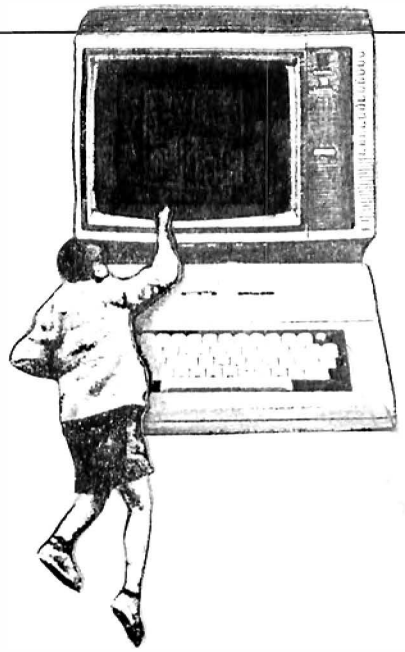
Three Methods

This Valuation of Fixed Assets program lets you choose from three methods of calculating depreciation. The first is the straight-line method. It calls for you to enter the cost of the item or merchandise, the salvage or trade-in value that you hope for in the future, and the number of years of service life you expect from the item.

The second method is accelerated declining balance. This time you're asked for "years of service life" *first* and then the book value, which is the cost of the item the first year or the cost of the item minus accumulated depreciation for the following years. The important thing to remember when using this method is that the depreciation expense for each year is found by subtracting the accrued de-



System Requirements
Color Computer or Expanded MC-10
16K RAM
Color or Micro Color Basic
Printer Optional



preciation from the present book value of the asset at the beginning of the period. In addition, the value remaining on the books at the end of the service life on the item must equal its salvage value. The program does most of this for you. However, you must keep track of salvage-value/book-value balance.

The last method is sum-of-the-year digits. It's an accelerated method that provides the largest amount of depreciation during the first year and relatively smaller amounts in each succeeding year. Under this method, a common fraction that decreases in size each year is applied to the cost, less its salvage value. The program is set up for five years, which is the allowable depreciable life of a computer per the IRS. If you wish to add more years, you can add YI = lines after 540. However, you also have to change the YI = figures in lines 720–760 and add another line for each additional year. If you want the program to give you a printed statement of the output, change the PRINT statements of lines 250, 280, 360, 410 and 580 to PRINT# – 2, statements.

Even if you don't own a service or a business, this program can be useful to determine whether you spent hard-earned money on something with value-holding power or a quickly depreciating item.■

Address correspondence to Rod Weiss, 12 Woodland Circle, Columbus, GA 31904.

Program Listing.
Valuation of Fixed Assets

```
4Ø CLS
42 PRINT"**********************
*********"
5Ø PRINT@64+8, "* VALUATION OF *
"
6Ø PRINT@96+8, "* FIXED ASSETS *
"
65 PRINT@128+8,"* BY R. WEISS  *
"
67 PRINT"**********************
*********"
7Ø INPUT KD$
8Ø CLS:PRINT@66,"WHICH METHOD?"
9Ø PRINT@128+2,"1 - STRAIGHT LIN
E"
1ØØ PRINT@16Ø+2, "2 - ACCEL. DEC
LINING-BALANCE"
11Ø PRINT@192+2,"3 - SUM OF YEAR
S DIGITS"
12Ø INPUT N
13Ø IF N<1 OR N>3 THEN 8Ø
14Ø ON N GOSUB 2ØØ, 32Ø, 45Ø
15Ø CLS:GOTO 8Ø
2ØØ 'STRAIGHT LINE METHOD
2Ø5 CLS
21Ø INPUT"TOTAL COST OF MERCHAND
ISE"; TC
22Ø INPUT"SALVAGE VALUE";SV
23Ø INPUT"SERVICE LIFE";LX
24Ø D=(TC-SV)/LX
25Ø PRINT"ANNUAL DEPRECIATION IS
";D
26Ø INPUT"HOW MANY YEARS?";Y
27Ø AC=D*Y
28Ø PRINT"ACCUM. DEPRECIATION IS
 $";AC
29Ø PRINT"DO YOU WISH TO CONTINU
E? (Y/N)";
3ØØ INPUT KK$
31Ø IF KK$="Y" THEN 8Ø
315 IF KK$="N" THEN 7ØØ
317 GOTO 3ØØ
32Ø 'ACCELERATED DECLINING-BALAN
CE
33Ø CLS:INPUT"YEARS OF SERVICE L
IFE:";TL
34Ø INPUT"BOOK VALUE";BV
35Ø DP=(BV*2)/TL
36Ø PRINT"DEPRECIATION IS $";DP
37Ø PRINT"TO FIND ACCUMULATED"
38Ø PRINT"DEPRECIATION"
39Ø INPUT"ENTER LAST YEARS FIGUR
E";LY
4ØØ AD=LY+DP
41Ø PRINT"ACCU. DEPRECIATION IS
$";AD
42Ø PRINT"DO YOU WISH TO CONTINU
E? (Y/N)";
43Ø INPUT KL$
44Ø IF KL$="Y" THEN8Ø
442 IF KL$="N" THEN 7ØØ
443 GOTO 43Ø
45Ø 'SUM OF YEARS DIGITS
46Ø CLS:INPUT"TOTAL COST OF MERC
HANDISE ";SC
47Ø INPUT"SALVAGE VALUE";VS
48Ø INPUT"SERVICE LIFE";LS
49Ø INPUT"FOR WHICH YEAR?";YI
5ØØ IF YI=1 THEN 72Ø
51Ø IF YI=2 THEN 73Ø
52Ø IF YI=3 THEN 74Ø
53Ø IF YI=4 THEN 75Ø
54Ø IF YI=5 THEN 76Ø
55Ø SYD=(LS*(LS+1))/2
56Ø R=SC-VS
57Ø W=(R*YI)/SYD
58Ø PRINT"DEPRECIATION IS";W
59Ø PRINT"DO YOU WISH TO CONTINU
E? (Y/N);
6ØØ INPUT KK$
61Ø IF KK$="Y" GOTO 8Ø
612 IF KK$="N" THEN 7ØØ
7ØØ PRINT@416-2Ø,"END":END
72Ø YI=5:GOTO 55Ø
73Ø YI=4:GOTO 55Ø
74Ø YI=3:GOTO 55Ø
75Ø YI=2:GOTO 55Ø
76Ø YI=1:GOTO 55Ø
```

END

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Ted Malaska, President & Co-founder of TCE Programs Inc., announced today a new division for the development of business software.

The new division will distribute a series of machine language business programs, under the name *Child's Play* beginning in the first half of 1985. The *Child's Play* series will use mouse technology and what Mr. Malaska termed "*Floating Overlays*", to control the operations within the program.

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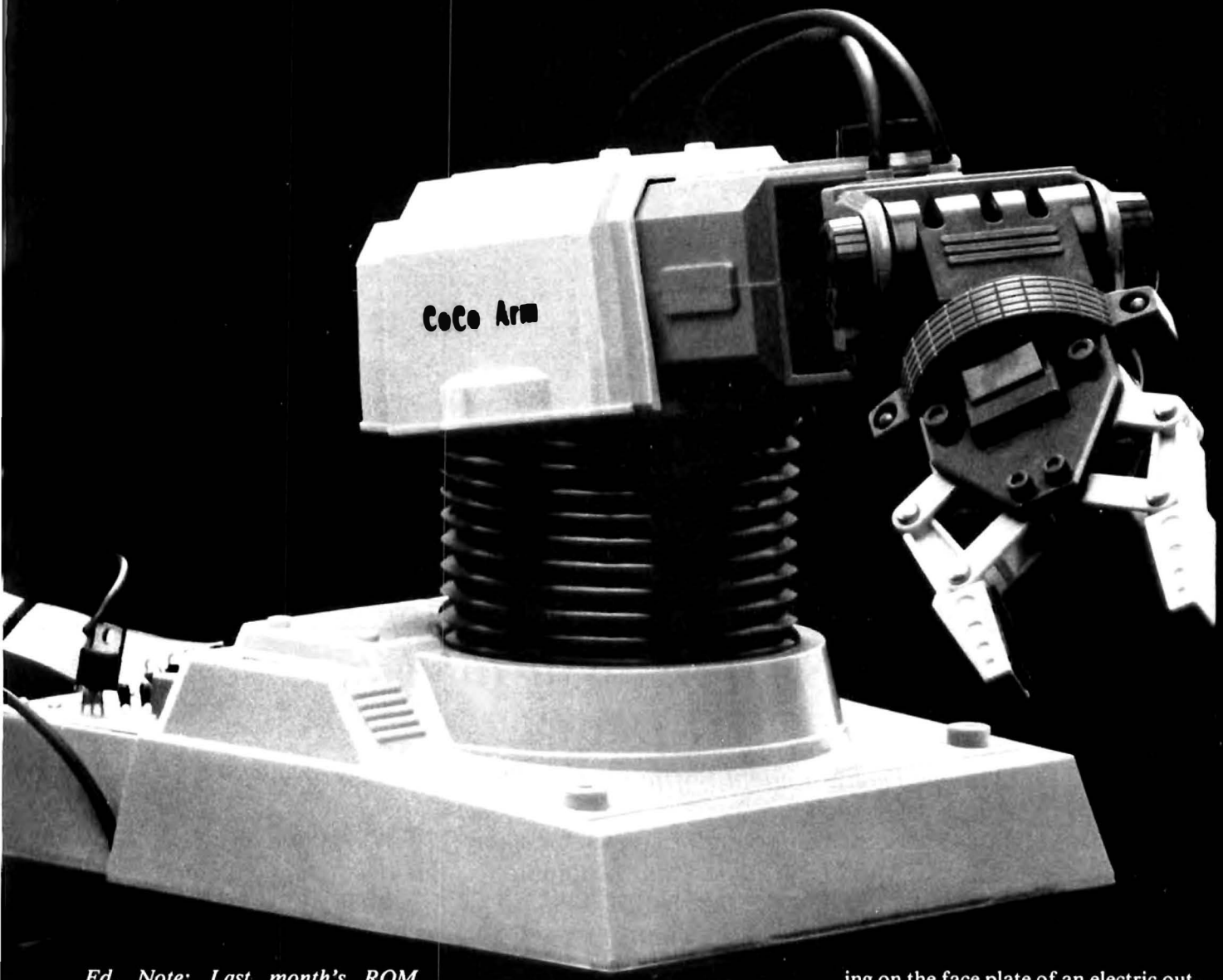
HARDWARE CONSTRUCTION

BY JAMES J. BARBARELLO

ROM HACKER PART V

Complete and test your computer-controlled robot arm, and then get ready for what's next.



Ed. Note: Last month's ROM Hacker ended with the instructions on how to modify the Armatron itself for computer control. This month Jim Barbarello shows you how to fabricate the PC board electronics.

Fabricate a PC board from Fig. 1. Use three additional 16-pin sockets to mount Q1 to Q12 instead of soldering them directly to the board. Mount all parts to the PC board by following Fig. 2. Be sure to observe the polarity of IC1, Q1 to Q12, C1, and C2. Keep in mind that the MOSFETs are static-sensitive. Handle them only by their ends. Before touching them, neutralize any static charge you might have by touching a ground point, such as the screw holding on the face plate of an electric outlet. Make sure that you mount the MOSFETs with the printing on them facing upside down.

Connect the two lugs on J1 to the two square, undrilled pads on the PC board using short lengths of wire. Refer to Fig. 2. Then cut six five-inch lengths of black wire and six five-inch lengths of red wire. Strip ¼ inch of insulation from both ends of all wires.

This program is available on our Instant CoCo cassette.
See the Instant CoCo ad elsewhere in this issue.

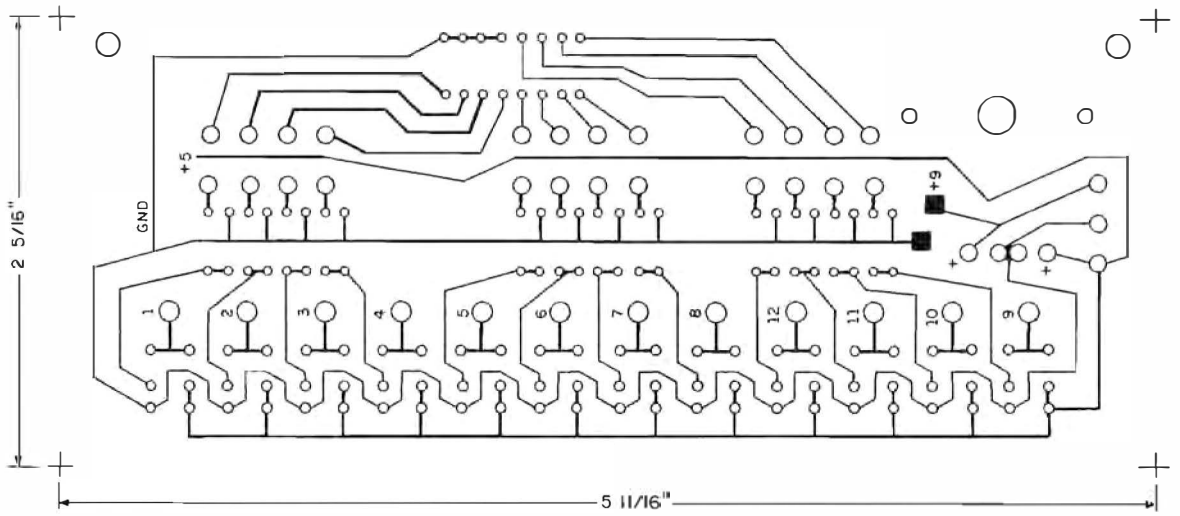


Fig. 1. Control PC Board Layout and Dimensions

Solder the wires to the 12 remaining pads according to Fig. 2. Follow Fig. 3 to solder the other ends of the wires to the terminals on the six motors.

Use the dimensions in Fig. 4 to cut a blank plate from PC-board stock. Then, etch off all the copper and set it aside for the moment. Place the PC board with the electronics on the face plate area, letting the two mounting holes fall on the corner wedges. Drill holes with a $^{3}/_{32}$-inch bit through the corner wedges by using the mounting holes in the PC board to guide you. Carefully thread #4 ½-inch sheet-metal screws into each of the two holes to secure the PC board to the unit. Then, position the blank plate over the opening above the PC board, testing it for proper fit. When you are satisfied with the way it fits, glue it down with Duco cement—you've completed construction of the CoCo Arm.

Test and Alignment

Because of its inexpensive hardware construction, the CoCo Arm is not a precision device. Slippage among the gears, speed variations in the motors, and other physical factors cause the performance of the CoCo Arm to be inaccurate. But you can compensate for these variations to make your CoCo Arm extremely precise with the software you'll find here.

Program Listing 1 lets you test your CoCo Arm to determine calibration factors you need to implement the control program. Enter and save Listing 1 under the name of RTD and then run it. The screen shows 12 commands with explanations of the functions they perform. To the right of the function is a large, black-bordered box displaying JB and X = 0.

This is the best time to attach the DIP connector from your Master In-

System Requirements
16K RAM
Extended Color Basic

"Before you touch the MOSFETs, neutralize any static charge you might have by touching a ground point."

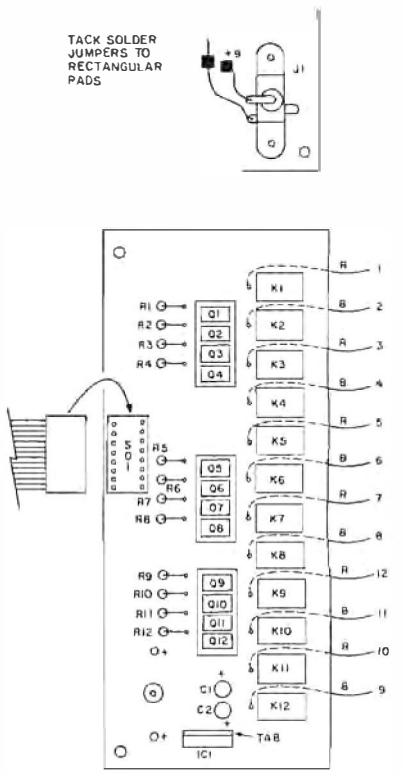


Fig. 2. Control PC Board Component Placement

terface to S01 on the CoCo Arm. The DIP cable has a white triangle embossed on its connector that must point away from the CoCo Arm when you hook it up. Connect the power cube plug to J1 by pushing it through the hole in the PC board.

Type HR and press the enter key. The hand part of your CoCo Arm will begin to rotate to the right. Press the enter key again to stop movement. Note that when you press the enter key, the contents of the black-bordered box change. You'll find that HR (for hand right) has taken the place of JB and that the value of X has changed. Repeat this procedure for the 12 commands in Table 1 to make sure that each command works properly.

"When you are sure that all functions are operating properly, begin determining the calibration factors."

If AR, AL, AU, or AD do not function, you'll have to add phantom resistors to the circuit (see Fig. 5). If you hear a whirring sound, but see no movement, you'll have to reposition the motors so that they properly engage with the drive gears. From left to right as you face the robot arm, the six motors control the movements of the fingers, elbow, hand up and down, hand left and right, arm left and right, and arm up and down.

When you are sure that all functions are operating properly, begin determining the calibration factors. Enter the FO command to move the fingers all the way out. Then execute FI, the opposite command, stopping movement when the fingers have closed all the way. The number in the black-bordered box indicates the required factor for 100-percent movement of the function you are calibrating. Write on a piece of paper, FI:X = nnnn, where nnnn is the factor. Carry out the same procedure for the remaining 11 functions.

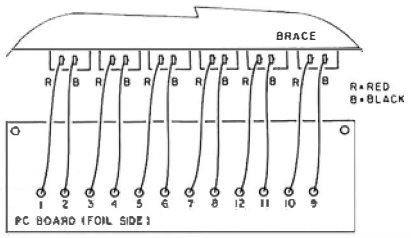


Fig. 3. Final Wiring

Enter the command program, Listing 2, and save it under the name RC. Line 30 defines the PO and F arrays. The F array contains a number that is the factor divided by 100. The CS$ (command string) in line 20 contains the 12 commands you use to control the CoCo Arm. The subscript of the F array corresponds to the command position in the string. For example, F(1) corresponds to AL, and F(12) corresponds to HD. Change the F array elements according to the factors you determined with the RTD program. For instance, if you determine that the factor of AD is 1,250, change F(4) to 12.5. AD is the fourth command in the CS$ string, and 12.5 is 1,250 divided by 100. Table 1 contains factor array elements, POKEs you use to create movement, and motors associated with the 12 movement commands.

Robot Command

When you have revised all the factors, resave the program. Don't apply power to the CoCo Arm until you have run Listing 1 or 2. Otherwise the PIA lines might not all be low, and the robot arm will begin moving in some manner. After you have run Listing 2, apply power to the Arm by plugging the power pack (cube) into the wall and the power plug into J1. The program asks you "Load Procedure File (Y/N)?" Press N. The screen clears and displays the title "Robot Commander." Below the ti-

```
1 REM**  ROBOT ARM TEST & DEMO
2 REM**  NAME: RTD
3 REM**  (C)1984, J.J.B.
4 REM**  V1.1, 8/Ø1/84
5 REM
1Ø C = &HCØØØ:D=&HCØØ2:DIM POK(1
2)
2Ø POKEC+1,Ø:POKEC,255:POKEC+1,4
:POKEC,Ø
3Ø POKED+1,Ø:POKED,255:POKED+1,4
:POKED,Ø
4Ø CS$="ALARAUADELERFIFOHLHRHUHD
":C$="J8"
5Ø PO(1)=8:PO(2)=4:PO(3)=1:PO(4)
=2' P I A   S I D E   B!
6Ø PO(5)=8:PO(6)=4:PO(7)=1:PO(8)
=2:PO(9)=64:PO(1Ø)=128:PO(11)=32
:PO(12)=16'P I A   S I D E   A!
7Ø CLS:PRINT"*** coco robot arm
test/demo ***";
8Ø PRINT"COMMAND   --FUNCTION PE
RFORMED--";
9Ø PRINT"   AL      ARM LEFT  "ST
RING$(1Ø,128)
1ØØ PRINT"   AR      ARM RIGHT ";
STRING$(2,128)"  "C$"  "STRING$(
2,128)
11Ø PRINT"   AU      ARM UP    ";
STRING$(2,128);:PRINTUSING"X=###
#";INT(6.5*I);:PRINTSTRING$(2,12
8)
12Ø PRINT"   AD      ARM DOWN  ";
STRING$(1Ø,128)
13Ø PRINT"   EL      ELBOW LEFT"
14Ø PRINT "   ER      ELBOW RIGHT
"
15Ø PRINT"   FI      FINGERS IN"
16Ø PRINT "   FO      FINGERS OUT
"
17Ø PRINT"   HL      HAND LEFT"
18Ø PRINT"   HR      HAND RIGHT"
19Ø PRINT"   HU      HAND UP"
2ØØ PRINT"   HD      HAND DOWN"
21Ø C$="  ":INPUT"ENTER COMMAND.
..";C$
22Ø IF LEN(C$)<>2 THEN 7Ø
23Ø I=INSTR(CS$,C$):IF I=Ø THEN
7Ø
24Ø I=(I+1)/2:IF I<5THEN SIDE=&H
CØØ2 ELSE SIDE=&HCØØØ
25Ø PRINT@448,"PRESS any KEY TO
STOP FUNCTION";
26Ø POKE SIDE,POK(I)
27Ø A$=INKEY$:IFA$=""THENI=I+1:G
OTO27Ø
28Ø POKE C,Ø:POKED,Ø:GOTO 7Ø
```

Program Listing 1. Test and Determination of Calibration (RTD)

F(n)	Command	Motor*	POKE**
1	AL (arm left)	2	B, 8
2	AR (arm right)	2	B, 4
3	AU (arm up)	1	B, 1
4	AD (arm down)	1	B, 2
5	EL (elbow left)	5	A, 8
6	ER (elbow right)	5	A, 4
7	FI (fingers in)	6	A, 1
8	FO (fingers out)	6	A, 2
9	HL (hand left)	3	A, 64
10	HR (hand right)	3	A, 128
11	HU (hand up)	4	A, 32
12	HD (hand down)	4	A, 16

*Numbered 6-1 from left to right.

**PIA side, decimal number, B = $C002; A = $C000.

Table 1. List of Movement Commands

tle you'll find "Help = Instructions, End To End." Enter a command, such as HR 25. The CoCo Arm will move according to your instruction. Make sure that there is a space between the command and the percent of movement number.

Robot Commander lets you create and use nested subprocedures within a procedure or to call another procedure from a procedure. The program has five commands: Make, End, Do, List, and Help. Use the Make command, followed by a blank space and up to an eight-character name, to create a file of the procedure that you want to enter. The End command signals the end of the Make function. The Do command executes a procedure. List All calls a display of all the names of the procedures you have filed. Typing List and the name of the procedure lists all the commands in that procedure. The program has two help screens available through the Help command. Use GOTO 30 to reenter a program if you inadvertently end it.

The following test routines will help you familiarize yourself with this program. Enter "Make Test." When you see the make screen, enter the commands below. Press the enter key after each command.

```
HR 20
FO 20
HL 25
FI 10
END
```

Press the enter key to return to the command mode. Then enter "Do Test." The screen displays the message "Executing Test." When the CoCo Arm finishes executing the commands specified by the test, the program returns to the command mode. Now enter "Make Move." After the program displays the make screen, enter the following commands.

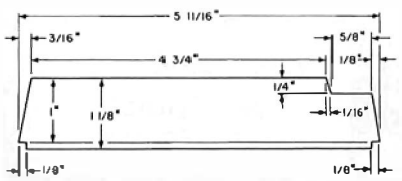


Fig. 4. Blank Plate Machining Details

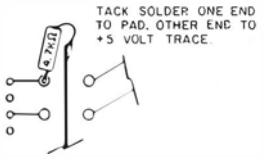


Fig. 5. "Phantom" Resistor Attachment

```
TEST
AL 10
TEST
AR 10
END
```

Press the enter key to return to the command mode and enter "Do Move." The CoCo Arm should move left and right at 10 percent of full travel, performing the test procedure in between. To revise a procedure, enter "Make" and the name of the procedure. The program informs you that a file by this name already exists and asks you if you would like to recreate the file. If you respond Y for yes, the new movement commands you enter supersede the previous ones, but are not permanent until you enter "End" and follow the Save procedure.

Connections And What's Next

This project completes the ROM Hacker series. I hope you have enjoyed it as much as I have. I am pleased to receive your calls and letters.

Many of you have run into a problem because Spectrum Projects has been unable to provide the Master Interface cable and connector. Bob Rosen of Spectrum said that everyone who ordered these parts from Spectrum will receive a refund. An alternative source for the connector is Alpha Products (79-04 Jamaica Ave., Woodhaven, NY 11421, 800-221-0916). It is also possible to make the cable yourself from parts available at your local Radio Shack store. If you would like details about this, please send me a legal-size, self-addressed, stamped envelope.

My next hardware venture is based on a completely different concept. I am presenting a CoCo-based, handicapped-assistance system. It can provide the handicapped person with the ability to gain control over his environment at a cost that won't break anyone's wallet. The series should also be intriguing to readers who are not interested in handicapped-assistance programs, because the hardware can be used for home control. One aspect of the series is the construction of a Plug-'N-Power-like controller. It lets you control up to 48 remote receiving units through your electrical wiring. As always, I'll be providing complete construction details and programming material. ■

Address correspondence to James J. Barbarello, RD 1, Box 241H, Tennent Road, Englishtown, NJ 07726.

Program Listing 2. Robot Command

```
1 REM**  COCO ROM HACKER
2 REM**  ROBOT COMMANDER (RC)
3 REM**  (C)1984 J.J.B.
4 REM**  V1.1 - 8/Ø1/84
5 REM
1Ø CLS:PMODE Ø:PCLEAR 1:CLEAR 8Ø
ØØ:BL$=STRING$(32,128):DIMP$(2Ø)
,PN$(2Ø),P(2Ø),S(2Ø),PO(12),F(12
)
2Ø C=&HCØØØ:POKE C+1,Ø:POKE C,25
5:POKE C+1,4:POKE C,Ø:D=&HCØØ2:P
OKED+1,Ø:POKED,255:POKED+1,4:POK
ED,Ø:CS$="ALARAUADELERFIFOHLHRHU
HD":GOSUB 6ØØ
3Ø PO(1)=8:PO(2)=4:PO(3)=1:PO(4)
=2:PO(5)=8:PO(6)=4:PO(7)=1:PO(8)
=2:PO(9)=64:PO(1Ø)=128:PO(11)=32
:PO(12)=16:F(1)=2Ø:F(2)=2Ø:F(3)=
1Ø:F(4)=1Ø:F(5)=12:F(6)=12:F(7)=
9:F(8)=9:F(9)=9:F(1Ø)=9:F(11)=1Ø
:F(12)=1Ø'F(X)=FACT/1ØØ(%)
4Ø CLS:PRINT" R O B O T   C O M
M A N D E R":PRINT@32,"(help=INS
TRUCTIONS, end TO END)":PRINTBL$
;
5Ø PRINT@96,"  "C$:PRINT" ":IFF=
1THENF=Ø:IFPN<>ØTHENPRINT@16Ø,"P
ROCEDURES:":FORI=1TOPN:PRINTLEFT
$(PN$(I)+STRING$(7,32),8);:NEXT
6Ø PRINT@128,;:INPUT C$:IF C$="H
ELP"THEN5ØØELSEIFINSTR(C$,"MAKE
")<>ØTHEN15ØELSE IF INSTR(C$,"DO
 ")THEN3ØØELSEIFINSTR(C$,"LIST "
)<>ØTHEN4ØØELSEIFC$="END"THEN 7Ø
Ø
7Ø S=INSTR(C$," "):IFS<>3 THEN 9
Ø ELSE CC$=LEFT$(C$,2)
8Ø J=INSTR(CS$,CC$):IFJ<>ØTHEN1Ø
Ø
9Ø C$="COMMAND NOT RECOGNIZED":G
OTO 5Ø
1ØØ J=(J+1)/2:T=VAL(MID$(C$,4,2)
):IFT<1ORT>99THEN4Ø
11Ø IF J<5 THEN SIDE=&HCØØ2 ELSE
 SIDE=&HCØØØ
12Ø POKE SIDE,PO(J):FORI=1TO F(J
)*T:NEXT:POKE C,Ø:POKED,Ø:GOTO 4
Ø
14Ø '**MAKE**
15Ø S=INSTR(C$," "):A$=LEFT$(RIG
HT$(C$,LEN(C$)-S),8):C$=""
16Ø CLS:PRINT"make procedure: ";
A$:PRINTBL$;:TMP=PN
17Ø IFPN=ØTHENPN=1:PN$(1)=A$:GOT
O2ØØELSE FOR I=1TOPN:IFPN$(I)<>A
$THENNEXT:PN=PN+1:PN$(PN)=A$:GOT
O2ØØ
18Ø PRINT@128,"PROCEDURE EXISTS.
 REDO (Y/N)?";
19Ø GOSUB8ØØ:IF Q$="N"THENC$="RE
DO "+PN$(I)+" ABORTED":GOTO 4Ø E
LSE PN=I:P$(PN)=""
2ØØ PRINT@128,"  "C$:PRINT" ":PR
```

Listing continued

Listing continued

```
INT@16Ø,;
21Ø INPUT C$:IF INSTR(C$,"END")<
>ØTHEN26ØELSES=INSTR(C$," "):IFS
=Ø THEN 23Ø ELSE S=S-1:CC$=LEFT$
(C$,S)
22Ø J=INSTR(CS$,CC$):IFJ<>ØTHENJ
=(J+1)/2:GOTO24Ø
23Ø IFPN=ØTHEN29ØELSEFORI=1TOTMP
:IFC$=PN$(I)THENP$(PN)=P$(PN)+CH
R$(I+127):GOTO2ØØELSENEXT:GOTO29
Ø
24Ø T=VAL(RIGHT$(C$,LEN(C$)-S)):
IFT<1ORT>99THEN21Ø
25Ø P$(PN)=P$(PN)+CHR$(J)+CHR$(T
):GOTO 2ØØ
26Ø P$(PN)=P$(PN)+CHR$(255):PRIN
T@327,"PROCEDURE COMPLETE":IFTMP
>PN THEN PN=TMP
27Ø PRINT@483,"PRESS enter TO CO
NTINUE...";
28Ø C$=INKEY$:IFC$=""THEN28ØELSE
IFASC(C$)=13THEN4ØELSE28Ø
29Ø C$="COMMAND NOT RECOGNIZED":
GOTO2ØØ
3ØØ IFPN=ØTHEN9ØELSEFORI=1TOPN:I
FINSTR(C$,PN$(I))=ØTHENNEXT:GOTO
9Ø
31Ø CLS:PRINT@324,"EXECUTING ";P
N$(I)
32Ø S=1:A$=P$(I):S(1)=I:P=1:FORI
=2TO2Ø:P(I)=Ø:S(I)=Ø:NEXT
33Ø N=ASC(MID$(A$,P,1)):IF N=255
 THEN 37Ø
34Ø IFN>127THEN36ØELSE T=ASC(MID
$(A$,P+1,1)):IF N<5THEN SIDE=&HC
ØØ2 ELSE SIDE=&HCØØØ
35Ø POKE SIDE,PO(N):FOR X=1 TO F
(N)*T:NEXT:POKE C,Ø:POKE D,Ø:P=P
+2:GOTO 33Ø
36Ø IF N>147 THEN POKE C,Ø:C$="E
RROR":GOTO 4Ø ELSE N=N-127:P(S)=
P+1:S=S+1:P=1:A$=P$(N):S(S)=N:GO
TO 33Ø
37Ø S=S-1:IFS=ØTHEN4Ø ELSE A$=P$
(S(S)):P=P(S):GOTO33Ø
39Ø '**LIST**
4ØØ S=INSTR(C$," "):A$=RIGHT$(C$
,LEN(C$)-S):C$=""
41Ø FORI=1TOPN:IFA$<>PN$(I)THENN
EXT:C$="PROCEDURE NOT AVAILABLE"
:F=1:GOTO4Ø
42Ø CLS:PRINT"procedure: "A$:A$=
P$(I):IFA$=CHR$(255)THENPRINT"/E
ND":GOTO27Ø
43Ø FORI=1TOLEN(A$)-1:IFASC(MID$
(A$,I,1))<127THENJ=ASC(MID$(A$,I
,1)):PRINTMID$(CS$,J*2-1,2);:I=I
+1:PRINTASC(MID$(A$,I,1));CHR$(8
)"/";:GOTO45Ø
44Ø PRINTPN$(ASC(MID$(A$,I,1))-1
27)"/";
45Ø NEXT:PRINT"END":GOTO27Ø
5ØØ CLS:PRINT"********** H E L
P **********":PRINT"MOVEMENT C
OMMAND SYNTAX= XX YY  XX=CMD, YY
=% FULL RANGE (1-99)  ":PRINT"cm
d --action--","cmd --action--":P
RINT" AL=ARM LEFT"," FI=FINGERS
IN":PRINT" AR=ARM RIGHT"," FO=FI
NGERS OUT"
51Ø PRINT" AU=ARM UP"," HL=HAND
LEFT":PRINT" AD=ARM DOWN"," HR=H
AND RIGHT":PRINT" EL=ELBOW LEFT"
," HD=HAND DOWN":PRINT" ER=ELBOW
 RIGHT"," HU=HAND UP":PRINT:PRIN
T"A SPACE must SEPARATE XX AND Y
Y."
52Ø PRINT@485,"PRESS enter FOR M
ORE...";:GOSUB 91Ø
53Ø PRINT@64,"DIRECT COMMANDS: D
O, MAKE, LIST  ":PRINT"SYNTAX: d
o name":PRINT"ACTION: DOES PROCE
DURE 'NAME'":PRINTTAB(7)"(NAME <
= 8 CHARACTERS).":PRINT"SYNTAX:
make name":PRINT"ACTION: MAKES A
 PROCEDURE 'NAME'"TAB(7)"(END MA
KE WITH 'END')"
54Ø PRINT"SYNTAX: list name":PRI
NT"ACTION: LIST PROCEDURE 'NAME'
":PRINT:PRINT:GOTO 27Ø
6ØØ CLS:PRINT " R O B O T  C O
M M A N D E R":PRINTBL$:PRINT@13
Ø,"LOAD PROCEDURE FILE (Y/N)?...
"
61Ø GOSUB 8ØØ:IF Q$="N"THENRETUR
NELSEGOSUB9ØØ
62Ø PRINT@264,"SEARCHING...":OPE
N"I",#-1,"ARMDATA":PRINT@264,"LO
ADING...":INPUT#-1,PN
63Ø FORI=1TOPN:INPUT#-1,PN$(I),L
:FORJ=1TOL:INPUT#-1,DAT:P$(I)=P$
(I)+CHR$(DAT):NEXTJ,I:CLOSE:RETU
RN
7ØØ CLS:PRINT" R O B O T  C O M
 M A N D E R ":PRINTBL$:PRINT@13
Ø,"SAVE PROCEDURE FILE (Y/N)..."
:IFPN=ØTHENQ$="N"ELSEGOSUB8ØØ
71Ø IFQ$="N"THENQ$="NO SAVE. ":G
OTO73Ø
72Ø GOSUB9ØØ:PRINT@264,"SAVING..
.":OPEN"O",#-1,"ARMDATA":PRINT#-
1,PN:FORI=1TOPN:X=LEN(P$(I)):PRI
NT#-1,PN$(I),X:FORJ=1TOX:D=ASC(M
ID$(P$(I),J,1)):PRINT#-1,D,:NEXT
J,I:CLOSE:Q$="DONE. "
73Ø PRINT@13Ø,Q$;"PROGRAM ENDED.
":PRINT" ":PRINT@258,"(ENTER GOT
O 3Ø TO REENTER)":PRINT@36Ø,;:EN
D
8ØØ Q$=INKEY$:IFQ$=""THEN8ØØ
81Ø IFQ$<>"Y"ANDQ$<>"N"THEN8ØØEL
SERETURN
9ØØ PRINT@13Ø,"PREPARE CASSETTE
RECORDER":PRINT@162,"PRESS enter
 WHEN READY..."
91Ø Q$=INKEY$:IFQ$=""THEN91Ø
92Ø IF ASC(Q$)<>13THEN92ØELSERET
URN
```

END

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A graphics drawing program designed to provide the computer hobbyist with easy manipulation of the powerful graphics capabilities of the CoCo. Advanced programmers can design graphics screens and characters for Basic and ML programs and games. In fact, Sketchpad was used to create the graphics for "Eagle" (see above). 32K. 2 Joysticks and disk drive required. **Disk or Amdek - $29.95.**

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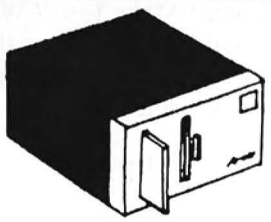

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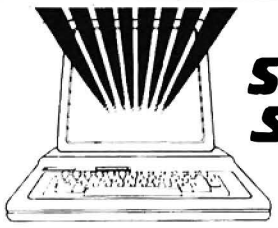

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Hot CoCo, Jan. '84 *"Super Screen represents a quality utility program that fills a definite need for the serious CoCo user. No other programs on the market so far have offered the error-trapping utility of Super Screen."*
Color Computer Magazine, May '84 *"Super Screen is a worthy addition to anyone's software library. It has become my most used utility and has made programming in BASIC on the Color Computer a joy..."*

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The Mark Data Products sales order processing system provides a fast, efficient means to enter orders, print shipping papers and invoices, prepare sales reports, and monitor receivables. The system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

The MDP Order Entry System is a family of programs which operate interactively by means of a "menu" selection scheme. Up to 900 products may be defined and a single disc system can hold over 600 transactions. When the operator selects a task to be performed, the computer loads a program designed to handle that task from the system disc. The system disc contains all of the programs required to create, update and maintain data files and prepare the necessary paperwork including shipping and invoice forms, daily sales reports, a monthly (or other period) sales report and a receivables report.

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Hot CoCo, June '84 *"...a serious, professional accounting program and well worth its price. The programs are complete and simple to use."*

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Up to 255 separate accounts may be defined and a single disc system can hold over 1,400 transactions. This system automatically enhances the monitor screen to a 51 character by 24 line display. 32K of memory is required along with an 80-column printer and one or more disc drives.

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ATTENTION SHOPPERS!

Protect yourself from surprises at the checkout counter by planning your shopping purchases on your CoCo.

Frank Cordelle photo

Do you ever do this? You go shopping, you reach the checkout register, and then you go into shock when you see the total ring up? You vow that next time you'll make a shopping list and add up all the prices of the items. What a chore!

With this shopping program, making the shopping list is a breeze. If you have a printer, the computer prints out your shopping list, complete with individual prices and totals. Your shopping list looks much like the list you receive from the computerized checkout registers.

System Requirements
32K Extended Color Basic
Cassette or Disk
Printer Optional

Selecting Items

The item selection screen displays 15 grocery items at a time. You enter your selections at the bottom of the screen. To select an item, enter the number shown at the left of that item, and then enter the number of units you want. If you want to change the listed price, enter it next. If you just press the enter key at this point, the price won't change. If you don't know how many units of an item you're going to buy, enter "1", and then the total amount you plan to spend for that item. This works well for items that are sold by the pound, such as bananas. The grand total of all items

selected appears at the bottom right of the screen. This total changes every time you select an item.

Making Changes

You may find yourself spending a larger total amount than you had planned. Then you look for items to take off the list. Go back to the item you decide to remove from your list, enter the item number, and enter zero units. The cost of that item will be subtracted from your total. You can also change the number of units of any item, and the totals will be recalculated.

I've set up control keys to scroll through the list. The up arrow moves up a full page, the down arrow moves down a full page, the left arrow moves up half a page, and the right arrow moves down half a page. If you enter a letter, the list starts with that letter at the top of the screen. For example, if you're at the beginning of your list and you want to select spaghetti, enter "S". The first item that begins with S will appear at the top of the screen.

Printing the List

When you're finished with your shopping list, press the shift and clear keys. This step avoids accidentally printing out the list before you're ready. You are then prompted to make sure that your printer is ready. The program prints out all the items that have a number of units greater than zero. At the end of the list, the grand total is printed, and a form feed is sent to the printer. All you do then is tear off your list, and you're ready to head for the store.

If you put your shopping list in a file, you can change the prices or add new items. To use a cassette file, make the changes as shown in Table 1. ■

```
12ØØ FL$="SHOPLIST"
121Ø OPEN "I", #-1,FL$
123Ø INPUT #-1,F$(I),N(I),P(I),E
(I),T
125Ø CLOSE #-1:MX=I-1:PTR=1
95ØØ FL$="SHOPLIST":OPEN "O",#-1
,FL$
951Ø FOR I= 1 TO 15Ø:PRINT#-1,F$
(I),N(I),P(I),E(I),T
952Ø CLOSE#-1:END
```

Table 1. Changes for Using a Cassette File

Address correspondence to Bill Reed, 429 Brooksboro Terrace, Nashville, TN 37217.

Program Listing. Shopping

```
5Ø CLEAR 8ØØ
6Ø GOSUB 5ØØ:'INITIALIZATIONS
7Ø A$=INKEY$:IF A$="" THEN 7Ø
8Ø IF A$>="Ø" AND A$<="9" THEN G
OSUB 4ØØØ
9Ø IF A$>="A" AND A$<="Z" THEN S
OUND1ØØ,1:GOSUB 7ØØØ
1ØØ IF A$=SC$ THEN GOSUB 5ØØØ:GO
TO 13Ø
11Ø IF A$=F1$ OR A$=F2$ OR A$=B1
$ OR A$=B2$ THEN GOSUB 3ØØØ
12Ø GOTO 7Ø
13Ø END
5ØØ '**************************
51Ø 'INITIALIZATIONS
52Ø '**************************
53Ø CLS:PRINT@6*32+5," ONE MOME
NT PLEASE...";
54Ø DIM F$(16Ø),N(16Ø),P(16Ø),E(
16Ø)
55Ø F1$=CHR$(1Ø):F2$=CHR$(9)
56Ø B1$=CHR$(94):B2$=CHR$(8)
57Ø SC$=CHR$(92)
58Ø P$="%         %  ##  ##.##
###.##"
59Ø L$="### %         % ### ##.##
 ###.##"
6ØØ CUR$=CHR$(175)
61Ø FOR I=1 TO 16Ø
62Ø READ F$(I),P(I)
63Ø IF F$(I)="END" THEN 65Ø
64Ø NEXT I
65Ø MX=I-1:PTR=1
66Ø GOSUB 1ØØØ
67Ø GOSUB 2ØØØ
68Ø RETURN
1ØØØ '**************************EDIT1ØØØ
1Ø1Ø 'PRINT TITLE SCREEN
1Ø2Ø '**************************
1Ø3Ø CLS:PRINT@32+8,"S H O P P I
 N G";
1Ø4Ø PRINT@3*32+9,"CONTROL KEYS"
;
1Ø5Ø PRINT@4*32,"   UP   ARROW -
 UP   1 PAGE"
1Ø6Ø PRINT@5*32,"   DOWN ARROW -
 DOWN 1 PAGE"
1Ø7Ø PRINT@6*32,"   LEFT ARROW -
 UP   1/2 PAGE"
1Ø8Ø PRINT@7*32,"   RGHT ARROW -
 DOWN 1/2 PAGE"
1Ø9Ø PRINT@9*32,"   ANY LETTER -
 STARTS AT LETTER";
11ØØ PRINT@1Ø*32+1,"<SHIFT>CLEAR
 - PRINT LIST"
111Ø PRINT@13*32+1,"ENTER ITEM #
, HOW MANY, PRICE"
112Ø PRINT@15*32,"    PRESS ANY
KEY TO START";
113Ø I$=INKEY$:IF I$="" THEN 113
Ø
1135 CLS:PRINT@68,"1. LOAD FILE?
":PRINT@132,"2. CONTINUE?"
1136 PRINT@499,"TYPE 1 OR 2";:GO
SUB9Ø1Ø
1137 IF AA<1 OR AA>2 THEN 1135
1139 CLS:ON AA GOTO 12ØØ,2ØØØ
114Ø RETURN
12ØØ FL$="SHOPLIST/DAT"
121Ø OPEN "I", #1,FL$
1215 FOR I= 1 TO 15Ø
122Ø IF EOF(DV)=-1 THEN 125Ø
123Ø INPUT #1,F$(I),N(I),P(I),E(
I),T
124Ø NEXT I
125Ø CLOSE #1:MX=I-1:PTR=1
2ØØØ '**************************
2Ø1Ø 'PRINT GROCERY ITEMS
2Ø2Ø '**************************
2Ø3Ø CLS
2Ø4Ø FOR I=Ø TO 14
2Ø5Ø IF PTR+I>MX THEN 2Ø8Ø
2Ø6Ø PRINT USING L$;PTR+I,F$(PTR
+I),N(PTR+I),P(PTR+I),E(PTR+I)
2Ø7Ø NEXT I
2Ø8Ø PRINT@15*32,"I#     N    P"
;
2Ø9Ø PRINT@15*32+2Ø,USING"TOT$##
##.##";T;:PRINT@15*32+3,CUR$;
21ØØ RETURN
3ØØØ '**************************
3Ø1Ø 'SCROLLING ROUTINE
3Ø2Ø '**************************
3Ø3Ø IF A$=F1$ THEN O1=15
3Ø4Ø IF A$=F2$ THEN O1=7
3Ø5Ø IF A$=B1$ THEN O1=-15
3Ø6Ø IF A$=B2$ THEN O1=-7
3Ø7Ø IF PTR+O1>MX THEN PTR=MX-O1
 ELSE PTR=PTR+O1
3Ø8Ø IF PTR<1 THEN PTR=1
3Ø9Ø GOSUB 2ØØØ
31ØØ RETURN
4ØØØ '**************************
4Ø1Ø 'ENTER ITEM#,UNITS,PRICE
4Ø2Ø '**************************
4Ø3Ø S9=15*32+3:E9=15*32+6:P9=15
*32+3:LN=3:TY$="N":C8$=A$:C9$=""
:GOSUB 621Ø:IT=C9
4Ø4Ø IF IT>MX THEN SOUND 2Ø,2:GO
TO 41ØØ
4Ø5Ø T=T-E(IT)
4Ø6Ø S9=15*32+9:LN=2:TY$="N":GOS
UB 6ØØØ:N(IT)=C9
4Ø7Ø S9=15*32+14:LN=5:TY$="N":GO
SUB 6ØØØ:IF C9$<>"" THEN P(IT)=C
9
4Ø8Ø E(IT)=N(IT)*P(IT)
4Ø9Ø T=T+E(IT)
41ØØ GOSUB 2ØØØ
411Ø RETURN
5ØØØ '**************************
5Ø1Ø 'PRINT SHOPPING LIST
5Ø2Ø '**************************
5Ø3Ø 'SET UP PRINTER
5Ø4Ø POKE15Ø,87:'6ØØ  BAUD
5Ø5Ø CLS:PRINT@68,"1. HARDCOPY?"
:PRINT@132,"2. SAVE FILE?"
5Ø55 PRINT@499, "TYPE 1 OR 2";:G
OSUB9Ø1Ø
5Ø6Ø IF AA<1 OR AA>2 THEN 5Ø5Ø
5Ø65 CLS:ON AA GOTO 5Ø9Ø,95ØØ
5Ø9Ø FOR I=1 TO MX
51ØØ IF N(I)>Ø THEN PRINT#-2,USI
NG P$;F$(I),N(I),P(I),E(I)
511Ø NEXT I
512Ø PRINT#-2,CHR$(1Ø)
513Ø PRINT#-2,USING"TOTAL COST $
$##.##";T
514Ø PRINT#-2,CHR$(12):'PAGE EJE
CT
515Ø RETURN
6ØØØ '**************************
6Ø1Ø 'INKEY INPUT SUBROUTINE
6Ø2Ø '**************************
6Ø3Ø P9=S9:E9=S9+LN:C9$=""
6Ø4Ø PRINT@P9,CUR$;
6Ø5Ø C8$=INKEY$:IF C8$="" THEN 6
Ø5Ø ELSE C8=ASC(C8$)
6Ø6Ø IF C8<32 AND C8<>8 AND C8<>
9 AND C8<>13 THEN 6Ø5Ø
6Ø7Ø IF C8<>13 THEN 6Ø9Ø
6Ø8Ø PRINT@P9," ";:C9=VAL(C9$):R
ETURN
6Ø9Ø IF C8<>8 THEN  614Ø
61ØØ IF P9=S9 THEN 6Ø5Ø
611Ø IF P9>S9+1 THEN C9$=LEFT$(C
9$,LEN(C9$)-1) ELSE C9$=""
612Ø PRINT@P9," ";:P9=P9-1:PRINT
@P9,CUR$;
613Ø GOTO 6Ø5Ø
614Ø IF C8<>9 THEN  619Ø
615Ø IF P9=E9 THEN 6Ø5Ø
616Ø PRINT@P9," ";:P9=P9+1:PRINT
@P9,CUR$;
```

Listing continued

Listing continued

```
617Ø C9$=C9$+" "
618Ø GOTO 6Ø5Ø
619Ø IF P9=E9 THEN 6Ø5Ø
62ØØ IF TY$="N" THEN IF (C8$>="Ø
" AND C8$<="9") OR C8$="." OR C8
$="+" OR C8$="-" THEN 621Ø ELSE
6Ø5Ø
621Ø C9$=C9$+C8$
622Ø PRINT@P9,C8$;:P9=P9+1:PRINT
@P9,CUR$;
623Ø GOTO 6Ø5Ø
7ØØØ '*************************
7Ø1Ø 'GO TO FIRST LETTER
7Ø2Ø '*************************
7Ø3Ø FOR I=1 TO MX
7Ø4Ø IF LEFT$(F$(I),1)=A$ THEN P
TR=1:GOTO7Ø8Ø
7Ø5Ø IF LEFT$(F$(I),1)>A$ THEN P
TR=I-1:GOTO 7Ø8Ø
7Ø6Ø NEXT I
7Ø7Ø PTR=I-1
7Ø8Ø IF PTR<1 THEN PTR=1
7Ø9Ø GOSUB 2ØØØ
71ØØ RETURN
8ØØØ '*************************
8Ø1Ø 'GROCERY ITEMS
8Ø2Ø '*************************
8Ø3Ø DATA ALUMN FOIL,1.75,APPLE
JUIC,1.59,APPLES,.25,APPLESAUCE,
.99
8Ø32 DATA ASPIRIN,1.59,BABY FOOD
,.39,BACON,2.19,BAK POWDR,.79
8Ø34 DATA BAK SODA,.79,BANANAS,.
49,BATHR TISS,1.29,BBQ SAUCE,1.1
9
8Ø36 DATA BEER,3.69,BISCUITS,.39
,BLEACH,.99,BOLOGNA,1.99
8Ø38 DATA BREAD,.59,BRKFST DRK,2
.69,CAKE FROST,1.Ø9,CAKE MIX,1.Ø
9
8Ø4Ø DATA CANDY,.35,CAT FOOD,2.5
9,CAT LITTER,1.99,CATSUP,1.59
8Ø42 DATA CEREAL,1.79,CHARCOAL,2
.99,CHEESE,2.59,CHICKEN,.99
8Ø44 DATA CHILI,.85,CHIP BEEF,1.
39,CHIP DIP,.89,CHOC CHIPS,1.89
8Ø46 DATA CIGARETTES,.9Ø,CINNAMO
N,1.99,CLEANER,1.99,COCOA,1.99
8Ø48 DATA COFFEE-CAN,5.58,COFFEE
-INS,3.45,COLA,2.29,COOKIES,1.99
8Ø5Ø DATA CORN,.55,CORN MEAL,1.1
9,CRACKERS,1.15,CREAMER,1.63
8Ø52 DATA CRESC ROLL,.69,CRM CHE
ESE,.55,CUBE STEAK,3.69,DEODORAN
T,1.18
8Ø54 DATA DETERGENT,2.59,DISH LI
Q,1.89,DOG FOOD,2.59,DRESSING,1.
99
8Ø56 DATA EGGS,1.29,FABRIC SOF,1
.99,FISH,1.89,FLOUR,.89
8Ø58 DATA FRNCH FRYS,1.19,FROZ D
INNR,1.79,FRUIT DRNK,.79,FRUIT-C
AN,.69
8Ø6Ø DATA GARLIC,.99,GELATIN,.39
,GINGER,1.99,GRAHAM CRK,1.29
8Ø62 DATA GREEN BEAN,.55,GRND BE
EF,1.29,HAM,1.19,HOT DOGS,2.Ø9
8Ø64 DATA ICE CREAM,2.59,JELLY,.
89,LETTUCE,.89,LIGHT BULB,2.79
8Ø66 DATA MAC&CHEESE,.49,MACE,1.
99,MARGARINE,1.Ø9,MATCHES,.79
8Ø68 DATA MAYONNAISE,1.69,MILK,1
.99,MOZ CHEESE,2.Ø9,MUSHROOMS,2.
99
8Ø7Ø DATA MUSTARD,.49,NUTMEG,1.9
9,OATMEAL,2.48,OLIVES,.99
8Ø72 DATA ONIONS,.39,ORANG JUIC,
1.Ø9,ORANGES,.25,OVEN CLNR,1.59
8Ø74 DATA PAPER NAPK,.93,PAPER T
OWL,.83,PARMES CHS,1.75,PEPPER,.
99
8Ø76 DATA PEPPERONI,1.Ø9,PICKLES
,1.65,PINEAPPLE,.75,PIZZA,2.69
8Ø78 DATA PNUT BUTTR,1.89,POPCOR
N,1.59,POPSICLES,1.99,PORK CHOPS
,1.99
8Ø8Ø DATA PORK&BEANS,.53,POT PIE
S,.59,POTATO CHP,1.89,POTATO FLK
,1.49
8Ø82 DATA POTATOES,1.29,PUDDING,
.69,RAZOR BLDS,1.68,RICE,.89
8Ø84 DATA ROAST,2.39,RUG SHAMPOO
,2.39,SAGE,1.99,SALT,.32
8Ø86 DATA SANDW BAGS,1.55,SHAMPO
O,1.99,SHAVE CRM,1.99,SHORTENING
,2.29
8Ø88 DATA SOAP,.59,SOAP PADS,1.2
9,SOUP,.35,SOUR CREAM,.85
8Ø9Ø DATA SOY SAUCE,1.29,SPAG SA
UCE,.89,SPAGHETTI,.89,SQUASH,.99
8Ø92 DATA SUGAR,1.69,SYRUP,1.99,
TAMPONS,2.99,TEA BAGS,2.49
8Ø94 DATA THYME,1.99,TOMATO PST,
.79,TOMATO SAU,.69,TOOTHPASTE,1.
89
8Ø96 DATA TOOTHPICKS,.49,TRASH B
AGS,2.19,TURKEY,.89,VANILLA,2.29
8Ø98 DATA VINEGAR,.79,WHIP CREAM
,1.Ø9,WOSTER SAU,1.15,YAMS,.89
81ØØ DATA ZUCCINI,.89,END,Ø
9ØØØ PRINT@48Ø,"PRESS ANY KEY TO
 CONTINUE.";
9Ø1Ø FOR AA=1 TO 2:A$=INKEY$:NEX
T
9Ø3Ø AA$=INKEY$:IFAA$=""THEN 9Ø3
Ø
9Ø4Ø AA=VAL(AA$):RETURN
95ØØ FL$="SHOPLIST/DAT":OPEN "O"
,#1,FL$
951Ø FOR I= 1 TO 15Ø:WRITE#1,F$(
I),N(I),P(I),E(I),T
9515 NEXT
952Ø CLOSE#1:END
```

END

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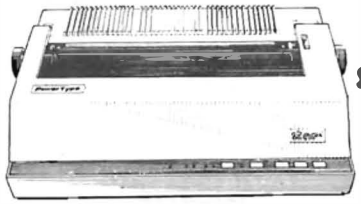

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BY RICHARD RAMELLA

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See the Instant CoCo ad elsewhere in this issue.

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Alphatoons is a computerized ABC book with 26 pictures keyed to the letters of the alphabet. Youngsters from 3 to 7 years old who have tried this game have enjoyed it.

Though Alphatoons is simple enough

System Requirements

16K RAM
Extended Color Basic

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for a young child to run, the varied scenes and large graphic letters available in Extended Color Basic heighten its interest level. I've used CIRCLE, LINE, and DRAW commands to create a variety of animals and objects. M is for moon, and this moon has craters and a short eclipse animation. The xylophone, a familiar instrument to many children, shows and sounds an octave of notes.

You'll have to explain the rules of the game to the young player. Type RUN and press enter to start the program. It draws a blue frame on the screen. Press any letter key and the computer responds with a short sentence, such as "A is for ant," with a scene illustrating the word. When the picture is drawn, a rectangular cursor appears at the bottom left of the word. The player then types in the word. Pushing the wrong letter key has no effect. It's a matter of finding the key for the letter just above the empty space and pressing it. When you type the word correctly, the program flashes an "okay" and sounds a few notes before the screen blanks for the next letter choice. The program continues until you press the break key to end it.

When you select a letter, only the letter key registers. There is one double-word entry, *ice cream,* and you must press the space bar between the words.

Very young players will need lots of

Program Listing. Alphatoons

```
2 GOTO 100
3 X=X-6: RETURN
4 Z$="092020505050797414": RETURN
5 Z$="0009096969787864640464737371716060000": RETURN
6 Z$="716060101001010080819196969780": RETURN
7 Z$="0009096969757572725050000": RETURN
8 Z$="7000000090979050565": RETURN
9 Z$="700000090565": RETURN
10 Z$="6010100101070729296969667646": RETURN
11 Z$="0009707905075": RETURN
12 Z$="2060296940049": RETURN
13 Z$="707777595939390606040479": RETURN
14 Z$="0009057020379": RETURN
15 Z$="000909079": RETURN
16 Z$="090000457070790":RETURN
17 Z$="090000797070": RETURN
18 Z$="1070707969190801":RETURN
19 Z$="0901107171746505":RETURN
20 Z$="1070707969190800179560": RETURN
21 Z$="0900000707073736464040479": RETURN
22 Z$="7000000040474747979090": RETURN
23 Z$="00704049": RETURN
24 Z$="0009097979070": RETURN
25 Z$="0049497": RETURN
26 Z$="0029294545696970":RETURN
27 Z$="007909707": RETURN
28 Z$="0045457045490": RETURN
29 Z$="0070700909079": RETURN
30 FOR H=1 TO LEN(Z$) STEP 4: LINE(X+VAL(MID$(Z$,H,1)),Y+VAL(MID$(Z$,H+1,1)))-(X+VAL(MID$(Z$,H+2,1)),Y+VAL(MID$(Z$,H+3,1))),PSET: NEXT: RETURN
100 CLEAR 500: PCLEAR 4: S$=" IS FOR ": PCLS 1
110 PMODE 3,1: COLOR 3,0: X=5: SCREEN 1,1: PCLS 1: LINE(0,0)-(255,135),PSET,B
120 COLOR 3,0: X=5: Y=140
130 Q$=INKEY$: IF Q$<"A" OR Q$>"Z" THEN 130
140 K=ASC(Q$)-63: GOSUB 690
150 X=X+20
160 K=INSTR("ABCDEFGHIJKLMNOPQRSTUVWXYZ",Q$): ON K GOSUB 180,210,220,250,300,310,330,340,350,360,380,400,420,440,460,490,520,540,550,560,570,580,600,630,660,680: IF JK=1 THEN JK=0: GOTO 110
170 GOTO 130
180 E$="ANT": A$=S$+E$: GOSUB 710
190 DRAW "BM80,60;D8L5H10U10R2U2R3U1R7R2E6U3R2U2E5R5U1R5D1R5F3R5F5D2R3U3E4U1E5R7U1R5U1R15D1R10D1R5D1F8R2F10D4R2D15L5U1L10U1L10H5L10H5L10H5L5H5L5G10L15U1L5H10G10"
200 DRAW "BM105,58;H4G20D10G5;BM120,56;E4F15D3F10;BM110,58;E3R2F3": CIRCLE(70,53),4: GOSUB 730: RETURN
210 E$="BALL": A$=S$+E$: GOSUB 710: FOR V=1 TO 50 STEP 2: CIRCLE(128,60),V,RND(3)+1: NEXT: GOSUB 730: RETURN
220 E$="CAT": A$=S$+E$: GOSUB 710: COLOR 4,0: LINE(128,40)-(100,120),PSET: LINE-(156,120),PSET: LINE-(128,40),PSET: CIRCLE(128,26),30,,.5
230 LINE(125,90)-(110,120),PSET: LINE(135,90)-(148,120),PSET: CIRCLE(128,32),10,,.5,.01,.5: CIRCLE(128,27),4: DRAW "BM100,20;U10F7;BM156,20;U10G7"
240 FOR V=118 TO 138 STEP 20: CIRCLE(V,20),3,,.2: NEXT V: FOR V=160 TO 190 STEP 3: LINE(150,100)-(V,30),PSET: NEXT V: GOSUB 730: RETURN
250 E$="DOG": A$=S$+"DOG": GOSUB 710: FOR V=200 TO 75 STEP -2: CIRCLE(V,70),20: NEXT
260 DRAW "BM195,50;R20HE10R5E10U10H8U4F12D20G15D50R5D5L20U5R5U15L5": CIRCLE(138,90),75,,.2,.01,.5
270 DRAW "BM65,90;D15R5D5L20U5R5U25": CIRCLE(40,50),20,,2: FOR V=1 TO 10: CIRCLE(40-V,48),18,,2,.5,.75: CIRCLE(40+V,48),18,,2,.75,1: NEXT V
280 FOR V=34 TO 46 STEP 12: CIRCLE(V,35),6,,2: CIRCLE(V-1,32),3: NEXT V: LINE(36,50)-(44,60),PSET,BF: LINE(35,75)-(45,73),PSET
290 COLOR 1,1: X=80: Y=70: A$="PUPPY GIRL": GOSUB 710: COLOR 3,0: GOSUB 730: RETURN
300 E$="EGG": A$=S$+E$: GOSUB 710: CIRCLE(170,50),50,,.9,.5,0: CIRCLE(170,50),52,,1.5,0,.5: FOR V=0 TO 3: PAINT(170,8),V,3: NEXT: X=130: Y=30: COLOR 1,1: FOR W=1 TO 6: A$=MID$("EASTER",W,1): GOSUB 710: Y=Y+14: NEXT W: GOSUB 730: RETURN
310 E$="FOUR": A$=S$+E$: GOSUB 710: FOR V=130 TO 10 STEP -1: COLOR RND(4),1: LINE(100,V)-(120,V),PSET: NEXT V: P=100: FOR V=10 TO 80: COLOR RND(4),1: LINE(P,V)-(P+20,V),PSET: P=P-1: NEXT: C=80: FOR V=30 TO 145: COLOR RND(4),1
320 LINE(V,C)-(V+15,C-15),PSET: NEXT: GOSUB 730: RETURN
330 E$="GOLD": A$=S$+E$: SCREEN 1,0: GOSUB 710: P=120: L=0: FOR G=1 TO 10: FOR V=30+L TO 220-L STEP 20: LINE(V,P)-(V+18,P+9),PSET,B: PAINT(V+3,P+3),2,3: NEXT V: L=L+10: P=P-10: NEXT G: GOSUB 730: SCREEN 1,1: RETURN
340 E$="HEART": A$=S$+E$: GOSUB 710: FOR V=90 TO 150 STEP 60: COLOR 4,1: CIRCLE(V,50),40: NEXT: CIRCLE(120,52),65,,1.1,.07,.45: LINE(150,112)-(124,130),PSET: LINE-(90,112),PSET: LINE(110,70)-(130,122),PRESET,BF: PAINT(110,70),4: GOSUB 730: RETURN
350 E$="ICE CREAM": A$=S$+E$: GOSUB 710: COLOR 4,0: FOR V=100 TO 200: LINE(150,130)-(V,50),PSET: NEXT: FOR V=1 TO 50: CIRCLE(150,50),V,RND(3)+1,1,.5,1: NEXT V: GOSUB 730: RETURN
360 E$="JET": A$=S$+E$: GOSUB 710: COLOR 2,0: DRAW "BM40,50;H20U4R15D2R10D3R10D2R130F5R5F5R5D2L5G5L5G5L40G35L1G1L1G1L20L1H1L1H1E35L40U2L2U2L35"
370 CIRCLE(140,32),14,,.5,.5,1: PAINT(140,40),2,2: FOR V=39 TO 51 STEP 3: LINE(80,V)-(180,V),PRESET: NEXT: GOSUB 730: RETURN
380 E$="KITE": A$=S$+E$: GOSUB 710: SCREEN 2,0: LINE(253,135)-(70,20),PSET: LINE-(60,10),PSET: LINE-(50,20),PSET: LINE-(60,35),P
```

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SET: LINE-(7Ø,2Ø),PSET: PAINT(6Ø
,2Ø),4,3: L=6Ø: FOR V=35 TO 12Ø:
 U=RND(2): IF U=1 THEN L=L+1 ELS
E L=L-1
39Ø PSET(L,V,RND(3)+1): NEXT: GO
SUB 73Ø: RETURN
4ØØ E$="LADDER": A$=S$+E$: GOSUB
 71Ø: COLOR 4,Ø: LINE(9Ø,4Ø)-(24
Ø,13Ø),PSET,BF: COLOR 3,Ø: L=13Ø
: FOR V=2Ø TO 13Ø STEP 1Ø: LINE(
V,L)-(V+1Ø,L-1Ø),PSET: LINE-(V+4
Ø,L-1Ø),PSET: LINE-(V+3Ø,L),PSET
: L=L-1Ø: NEXT: COLOR 3,1: LINE(
1ØØ,1Ø)-(18Ø,1Ø),PRESET
41Ø GOSUB 73Ø: RETURN
42Ø E$="MOON": PMODE 4,1: SCREEN
 1,1: A$=S$+E$: GOSUB 71Ø: CIRCL
E(15Ø,65),6Ø: PAINT(15Ø,7),1,1
43Ø COLOR Ø,1: FOR V=1 TO 1Ø: CI
RCLE(58+RND(14Ø),15+RND(1ØØ)),RN
D(3)*3: NEXT: FOR T=1 TO 5ØØ: NE
XT T: FOR V=Ø TO 15Ø STEP 3: CIR
CLE(V,65),6Ø,,1,.75,.25: NEXT: C
OLOR 1,Ø: GOSUB 73Ø: RETURN
44Ø E$="NIGHT": PMODE 4,1: SCREE
N 1,1: A$=S$+E$: GOSUB 71Ø:
45Ø FOR V=Ø TO 24Ø STEP RND(25):
L=RND(5Ø): LINE(V,13Ø)-(V+RND(5Ø
),13Ø-L),PSET,B: NEXT V: CIRCLE(
4Ø,4Ø),2Ø: PAINT(4Ø,4Ø),1,1: FOR
 V=1 TO 2ØØ: PSET(RND(255),RND(8
Ø),1): NEXT: GOSUB 73Ø: RETURN
46Ø E$="OCTOPUS": A$=S$+E$: GOSU
B 71Ø: COLOR 2,Ø: CIRCLE(128,6Ø)
,5Ø,,1.2,.5,1: LINE(78,6Ø)-(178,
6Ø),PSET: PAINT(128,1Ø),2,2: FOR
 V=11Ø TO 146 STEP 36: CIRCLE(V,
4Ø),5,4,.9: NEXT: CIRCLE(128,5Ø)
,15,1,.3,Ø,.5
47Ø U=82: FOR V=1 TO 8: M(V)=U:
U=U+13: NEXT: FOR P=6Ø TO 95: E=
RND(2): FOR V=1 TO 8: IF E=1 THE
N M(V)=M(V)-1 ELSE M(V)=M(V)+1
48Ø LINE(M(V),P)-(M(V)+5,P),PSET
: NEXT V,P: GOSUB 73Ø: RETURN
49Ø E$="PIE": A$=S$+E$: GOSUB 71
Ø: CIRCLE(128,67),68: LINE(128,Ø
)-(128,135),PSET: LINE(6Ø,67)-(1
96,67),PSET: FOR V=1 TO 25: P=12
8: L=67: P1=RND(2): L1=RND(2): I
F P1=1 THEN P=P-5 ELSE P=P+5
5ØØ IF L1=RND(2) THEN L=L-5 ELSE
 L=L+5
51Ø PAINT(P,L),RND(2)*2,3: NEXT:
 GOSUB 73Ø: RETURN
52Ø E$="QUAIL": A$=S$+E$: GOSUB
71Ø: CIRCLE(2ØØ,4Ø),2Ø: FOR V=6Ø
 TO 5 STEP -5: CIRCLE(13Ø,56),V,
,.2,.35: NEXT V: CIRCLE(162,6Ø),
4Ø,,1,1,.5: DRAW "BM227,4Ø;NL5NG
6NH6": DRAW "BM155,98;D2ØNL7NF7N
E7": DRAW "BM161,98;F15NL7NF7NE7
"
53Ø CIRCLE(21Ø,35),2,4,.7: DRAW
"BM2ØØ,2Ø;U8L2U2R4D2L2": PAINT(2
,2),2,3: GOSUB 73Ø: RETURN
54Ø E$="RING": A$=S$+E$: GOSUB 7
1Ø: CIRCLE(128,8Ø),55: CIRCLE(12
8,86),45: PAINT(128,3Ø),3,3: FOR
 V=1 TO 15: CIRCLE(128,2Ø),V,4:
NEXT: GOSUB 73Ø: RETURN
55Ø E$="STRING": A$=S$+E$: GOSUB
 71Ø: FOR V=1 TO 45: CIRCLE(5Ø,5
Ø),V: NEXT: P=9Ø: LINE(P,5Ø)-(25
Ø,5Ø),PSET: FOR V=45 TO 25 STEP
-1: CIRCLE(5Ø,5Ø),V,1,1,.Ø1,.99:
 LINE-(1ØØ+RND(2ØØ),5+RND(13Ø)),
PSET: NEXT V: GOSUB 73Ø: RETURN
56Ø E$="TREE": A$=S$+E$: GOSUB 7
1Ø: COLOR 4,Ø: LINE(12Ø,5Ø)-(135
,13Ø),PSET,B: COLOR 2,Ø: FOR V=1
 TO 1ØØ: CIRCLE(128+RND(1ØØ)-5Ø,
6Ø-RND(5Ø)),RND(12): NEXT: GOSUB
 73Ø: RETURN
57Ø E$="UMBRELLA": A$=S$+E$: GOS
UB 71Ø: CIRCLE(128,42),6Ø,,.5,.5
,1: FOR V=78 TO 178 STEP 2Ø: CIR
CLE(V,42),1Ø,,.5,.5,1: NEXT: DRA
W "BM126,42;D6ØF5R7E5L2G5L2H6U6Ø
": PAINT(127,44),3,3: PAINT(128,
4Ø),4,3: GOSUB 73Ø: RETURN
58Ø E$="VIOLIN": A$=S$+E$: GOSUB
 71Ø: COLOR 4,1: CIRCLE(21Ø,9Ø),
4Ø: CIRCLE(16Ø,75),3Ø: LINE(15Ø,
6Ø)-(2Ø,1Ø),PSET: LINE-(15,3Ø),P
SET: LINE-(15Ø,8Ø),PSET: LINE(25
,2Ø)-(21Ø,9Ø),PRESET: PAINT(25,2
5),4,4
59Ø FOR V=O TO 16 STEP 5: LINE(3
Ø,17+V)-(25Ø,99+V),PRESET: NEXT:
 GOSUB 73Ø: RETURN
6ØØ E$="WITCH": A$=S$+E$: GOSUB
71Ø: CIRCLE(128,67),34,,2: LINE
(6Ø,5Ø)-(188,5Ø),PSET: PAINT(128
,25),3,3: COLOR 4,Ø: FOR V=1 TO
2Ø: LINE(95,5Ø+RND(3Ø))-(75-RND(
3Ø),7Ø+RND(3Ø)),PSET: NEXT: FOR
V=1 TO 2Ø: LINE(161,5Ø+RND(3Ø))-
(181+RND(39),7Ø+RND(3Ø)),PSET
61Ø NEXT: FOR V=118 TO 138 STEP
2Ø: CIRCLE(V,6Ø),1Ø,2,.7: CIRCLE
(V,6Ø),4,4,.3: NEXT: COLOR 3,Ø:
DRAW "BM129,65;D5G6D2G6D3FR5U1R3
E7": FOR V=95 TO 11Ø: CIRCLE(128
,V),15,3,.8,.Ø1,.5: NEXT: GOSUB
73Ø: RETURN
63Ø E$="XYLOPHONE": A$=S$+E$: GO
SUB 71Ø: P=Ø: COLOR 4,Ø: FOR V=5
7 TO 77 STEP 2Ø: LINE(5,V)-(25Ø,
V+15),PSET,BF: NEXT: COLOR 3,Ø:
FOR V=1Ø TO 24Ø STEP 3Ø: LINE(V,
2Ø+P)-(V+25,13Ø-P),PSET,BF: P=P+
5: NEXT
64Ø COLOR 1,Ø: V$="CDEFGABC": Y=
7Ø: X=19: PLAY "T4": FOR V=1 TO
8: A$=MID$(V$,V,1): GOSUB 71Ø: P
LAY A$: X=X+18: IF V=7 THEN PLAY
 "O4"
65Ø NEXT: PLAY "O3": A$="XYLOPHO
NE": GOSUB 73Ø: RETURN
66Ø E$="YARDSTICK": A$=S$+E$: GO
SUB 71Ø: LINE(1Ø,5Ø)-(24Ø,8Ø),PS
ET,B: FOR V=6 TO 22ØSTEP 6: LINE
(V+15,55)-(V+15,6Ø),PSET: IF (V/
6)/12=INT((V/6)/12) THEN COLOR 2
,Ø: LINE(V+15,55)-(V+15,65),PSET
: COLOR 3,Ø: NEXT ELSE NEXT
67Ø COLOR 4,Ø: X=2Ø: Y=2Ø: A$="T
HREE FEET IN YARD": GOSUB 71Ø: X
=2: Y=1ØØ: A$="TWELVE INCHES IN
FOOT": GOSUB 71Ø: GOSUB 73Ø: RET
URN
68Ø E$="ZERO": A$=S$+E$: GOSUB 7
1Ø: CIRCLE(7Ø,66),65: CIRCLE(7Ø,
66),5Ø: PAINT(7Ø,15),2,3: Y=8Ø:
X=15Ø: A$="NOTHING": GOSUB 71Ø:
GOSUB 73Ø: RETURN
69Ø ON K GOSUB 3,4,5,6,7,8,9,1Ø,
11,12,13,14,15,16,17,18,19,2Ø,21
,22,23,24,25,26,27,28,29
7ØØ GOSUB 3Ø: RETURN
71Ø FOR P=1 TO LEN(A$): Q$=MID$(
A$,P,1): IF Q$=CHR$(32) THEN 72Ø
 ELSE K=ASC(Q$)-63: GOSUB 69Ø
72Ø X=X+12: NEXT P: RETURN
73Ø COLOR 3,Ø: LINE(1ØØ,163)-(11
5,168),PSET,BF: Y=16Ø: X=121: FO
R V=1 TO LEN(E$)
74Ø N$=INKEY$: IF N$<>MID$(E$,V,
1) THEN 74Ø
75Ø A$=N$: GOSUB 71Ø: NEXT
76Ø X=5: Y=18Ø: PLAY "T16": A$="
OKAY": GOSUB 71Ø: FOR V=1 TO 2Ø:
 PLAY MID$("CEG",RND(3),1): NEXT
: PLAY "T8": JK=1: RETURN
77Ø END
```

help typing the words to ease frustration and show the game's possibilities. Soon enough they'll want to experiment alone, and this will lead to learning the keyboard.

Is Alphatoons educational? Yes; all things are educational to small children. But be warned that no computer program can match the educational qualities of crayons, pencils, and supplies of blank paper. Preschoolers need to develop small muscle coordination in their hands, for in kindergarten and first grade, they'll have to grasp a writing tool and move it around a confined space, creating sensible shapes. Typing isn't the answer to this need, but Alphatoons is fun and can teach quite a bit.

The words in this electric abecedarian are ant, ball, cat, dog, egg, four, gold, heart, ice cream, jet, kite, ladder, moon, night, octopus, quail, ring, string, tree, umbrella, violin, witch, xylophone, yardstick, and zero. Some scenes show other words, but those are only important if the player asks about them.

The program uses all but about 435 bytes of a 16K system, so be wary of making changes in it. ■

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CoCo for Hire

WORD PROCESSING, PART II

by Terry Kepner and Linda Tiernan

We began this column last month with a look at the mechanics of word processing, and an introduction to working at home and how you go about it. This month we conclude our look at word processing.

Legalities

You should keep several factors in mind when you set up a word-processing business. One is the legal ramifications of typing someone else's copy. The words you type for your customers are not yours. Someone else wrote them, and someone else might legally own them.

If you retain copies of a manuscript for yourself or your files, you are violating copyright laws. Make it a habit not to discuss the copy you type with anyone but your customer. It might be very confidential. This is particularly important with theses and television scripts.

If you store text on tape or disk, erase or give the medium to your customer. Add to your charges if you include a tape or disk in this fashion, and don't include a copy of your word-processing program. This is actually an extra service because your customers can come back to you for additional copies in the future.You can ensure that your customers return to you for additional copies they might need by purchasing a datascrambler program, which makes your files unreadable by anyone but you.

When you finish a manuscript, make two copies and give both to your client. For the second copy you can photocopy, carbon copy, or print on an inexpensive paper stock.

If a customer is dissatisfied with the finished copy, in most cases you should promptly refund all money paid. Be sure that you receive all the materials you provided as part of your agreement.

Students can benefit from new tax laws that make part-time work earnings under $3,000 tax free. Call the Internal Revenue Service for more information. Unless you are a student, you must report any money you earn from a home business along with your regular wages. If you make enough money, you could move into a higher tax bracket, meaning that you'll lose some of your additional earnings to the IRS.

Prices and Charges

Typing services usually charge by the finished manuscript page. The standard page is double-spaced and has a title line, one-inch margins on all sides, and 10-characters-per-inch spacing (also called pica). Each page holds about 300 words in this format. Tighter character spacing, smaller margins, or different line spacing should change the price you charge.

To get an idea of current prices, check local newspapers for advertisements or a recent issue of *Writer's Market* to get an idea of the current rates and services offered by other typing services. Prices usually range from $1.50 to $2 or more per page. Because you are using a word processor and printer, you can easily offer two or more copies of a manuscript and charge a low rate for the additional copies. For example, you might charge $2 per page for the first copy and 50 cents per page for additional copies.

Another factor that should affect your charges for a job is the kind and amount of materials that you supply. Some customers will want to provide their own paper. But for a master's thesis you might have to supply a special weight of paper.

The look and feel of the paper you use can make a big difference in the appraisal of the final critic of a manuscript. In most cases, standard tractor-feed paper just isn't good enough for the job. Although the new laser-cut paper lets the tractor-hole strips separate cleanly, the perforations between the pages still give computer paper away.

Most of your customers are likely to be private individuals, such as students with term papers or theses, or businesspeople and others with resumes. It's a good idea to charge on a cash-on-delivery basis. For these occasional or small jobs, C.O.D. is fine.

If the bill becomes larger than petty-cash proportions, however, companies might ask for 30-day billing. Charge an additional fee for this kind of billing unless you anticipate long-term dealings with a company. In that case you can afford to be a little flexible and to offer better terms. But in most situations, C.O.D. should be the only way you accept payment.

Advertising

Your geographic location is apt to determine your market. If you live three blocks from a large university, you probably won't bother to look beyond that bonanza. If there is no college or university in your area, you'll find that you are eking out your market from local businesspeople and writers, among other sources. The market that you find nearby determines the sort of advertising you should employ.

To reach college students and professors, the campus newspaper and bulletin boards are the best media. Be sure to list all the formats you are

prepared to type: resumes, theses, and reports. To get your business started, you could tell customers that you'll give them a discount if they bring in a friend.

If you don't have a college nearby, post notices at the laundromat, grocery store, and library to attract authors in your area. You'll be surprised at the response. Another method is to search the local newspapers for community teaching programs that sponsor writing seminars. Leave information about your business with the instructors of such courses—be prepared for articles, novels, short stories, resumes, and research papers.

Don't advertise in every place at once. You might be taking on more than you can handle. Aim for the segment of the market that you feel is most likely to reward you with plenty of business. If you need to, you can always add other advertisements later on. Remember, the best advertising is word of mouth. If you turn out quality typing and manage it quickly, you'll have very few problems getting customers.

Setting Policy

Come up with a written service policy that you can hand out as part of a welcoming package for first-time customers. It should state exactly what services a customer can expect from you. Include your rates and an explanation of the method you use to adjust them, how and when you expect to be paid, and what print formats your equipment is capable of producing.

Your written service policy should outline all aspects of your service. If your customers know what to expect from the start, they aren't likey to be disappointed. This is the place to lay down the "law" about the legibility of manuscripts, or the turnaround time you promise. (Include some extra time in this figure in case an old friend shows up unexpectedly or you pull jury duty.) It's a good idea to include your telephone number in the policy as well—it may save some of your customers a great deal of aggravation.

A written service policy is a good place to mention some of the laws that govern a word-processing business. For example, you might include a line explaining that copyright laws prohibit you from photocopying government documents or large amounts of material for private use. Copyright laws (Title 17, U.S. Code) don't let you retain any copies of your finished work; a written policy is a good place to make sure your customers understand this and keep their own spare copies. Make sure your customers are aware that this law applies to copies of word-processing tapes and disks, too.

"A letter-quality printer is vitally important to a word-processing business. Don't let anyone tell you differently."

You might want to consider augmenting the service you provide. If most of your customers are students at the local university who might not have transportation, perhaps you are willing to pick up and deliver. Do you accept checks? When does a customer have a right to demand a refund? For what do you charge extra? You might be offering a unique service that no one else can offer. Set it down in your service policy.

Despite all the can'ts and won'ts, and all the disclaimers and warnings, be sure that your service policy shows that you welcome and value the business of your customers.

Tools of the Trade

You don't need a fancy system to start a CoCo typing service. A 64K Color Computer 2 is the best way to start, but a 16K CoCo will get the job done. The most important memory consideration is whether you have enough room in memory for both your word-processing program and at least one full page of text. If you have the older-model computer, you might consider getting a quality keyboard for it—but you won't need it immediately. See how the business works with the system you have now, and upgrade with the profits you earn.

A printer is vitally important to a word-processing business. Dot-matrix printers are simply not good enough. You must have a letter-quality printer, such as Radio Shack's DWP-210 printer, also called a daisy-wheel printer. Don't let anyone tell you differently. A master's theses is worthless if it is printed on a dot-matrix machine. Daisy-wheel printers are the standard. Some customers could be considering paying a great deal more for professional-quality typesetting and printing. Keep in mind that the quality of your print is the basis of the service you provide.

Software is the easiest part, since a good typist can take a bad word processor and make it perform successfully. A typewriter is about equal to the most basic and mediocre of word processors. In most cases all you need is a word processor that can paginate, print page headers, number pages automatically, and underline. Most other features benefit you as a typist, but have little effect on the product except in minor ways. For example, ROM-pack Scripsit uses reverse video to indicate uppercase letters. That does not provide the best on-screen appearance. If you find it objectionable, you can get a word processor that supplies true upper- and lowercase letters in its display, or get a lowercase hardware kit.

You don't need disk drives for a typing service because you aren't concerned with rapid text storage. In fact, your typing service will work just fine with a 16K CoCo, ROM-pack Scriptsit and a letter-quality printer. You can buy all the components you need for under $1,000 from Radio Shack.

Next month we'll discuss how you start a mailing-out list service and look at insurance for work-at-home businesses. ■

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Mindbusters

MAZEMAKER—SQUARE ONE FOR PUZZLERS

by Richard Ramella

Many artists and mathematicians have enriched the world by playing with puzzles. Lewis Carroll laced *Alice in Wonderland* with puzzles. Blaise Pascal invented the theory of probability while figuring the odds of a card game for a friend. Leonhard Euler founded topology—rubber-sheet geometry— by proving the impossibility of solving an obscure folk puzzle that sought to link bridges and islands. Leonardo da Vinci hid perfect circles in the face of the *Mona Lisa*. And M.C. Escher burst into a four-dimensional realm with his intriguing graphic art.

Mindbusters is an exploration of the world of puzzles grounded in a spirit of play. The underlying idea is to use puzzles as a jumping-off point for a better understanding of the physical world—and the computer. Computers and puzzles are linked by two main ingredients: math and logic. The Color Computer is a superb puzzle machine because it has power, speed, sound, and a prismful of graphics.

Amazement

Let's begin by considering the maze. There are many fabled mazes and some still extant from ancient times. The first mazes were probably conceived as a method of thwarting the onslaught of enemy soldiers. Folktales often portray labyrinths as prisons for enemies and as hiding places for lovers. The labyrinths of antiquity were often bound up in an aura of magic and mystery.

Today, lab animals run mazes in scientific experiments, while in the vast and sometimes very old gardens of Europe it is not uncommon to find beautiful labyrinths sculpted in shrubbery. Some churches display mosaic-tile labyrinths that symbolize the difficulty of traveling through life without erring spiritually. And thousands of years after its conception, the maze has a serious computer purpose—the use of maze-solving algorithms to study artificial intelligence. It's no wonder the maze is the playing environment of so many computer games.

The program listing for Mindbusters this month is called Mazemaker. It demonstrates how to create a logical maze by forming a 289-cell maze while you watch. When you run Mazemaker, most of the screen becomes a large block square—the stuff from which the maze's walls will be carved.

The program begins by randomly

System Requirements
16K RAM
Extended Color Basic

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100 REM * MAZEMAKER * TRS-80 EXT
ENDED COLOR BASIC 16K / RAMELLA
110 PMODE 4,1: PCLS 1: CLS: CLEA
R 3000: DIM A$(6): SCREEN 1,1: C
P=1
120 U=0: POKE 65495,0: LINE(5,5)
-(176,176),PRESET,BF
130 X=1+RND(17)*10: Y=1+RND(17)*
10
140 LINE(X-4,Y-4)-(X+4,Y+4),PSET
,BF
150 E=1+RND(10)
160 B=RND(4)
170 IF PPOINT(X-10,Y)=5 AND PPOI
NT(X+10,Y)=5 AND PPOINT(X,Y+10)=
5 AND PPOINT(X,Y-10)=5 THEN 330
180 IF B=1 AND PPOINT(X-10,Y)=5
OR B=2 AND PPOINT(X+10,Y)=5 OR B
=3 AND PPOINT(X,Y-10)=5 OR B=4 A
ND PPOINT(X,Y+10)=5 THEN 160
190 U=U+1: IF B=1 THEN FOR S=X-4
 TO X-14 STEP -1: LINE(S,Y-4)-(S
,Y+4),PSET: NEXT S: X=X-10
200 IF B=2 THEN FOR S=X+4 TO X+1
4: LINE(S,Y-4)-(S,Y+4),PSET: NEX
T S: X=X+10
210 IF B=3 THEN FOR S=Y-4 TO Y-1
4 STEP -1: LINE(X-4,S)-(X+4,S),P
SET: NEXT: Y=Y-10
220 IF B=4 THEN FOR S=Y+4 TO Y+1
4: LINE(X-4,S)-(X+4,S),PSET: NEX
T S: Y=Y+10
230 CP=CP+1: IF CP=289 THEN 390
240 GOSUB 270
250 IF U=E THEN U=0: GOTO 330
260 GOTO 160
270 X1$=STR$(X): Y1$=STR$(Y)
280 IF LEN(X1$)=3 THEN X$="0"+RI
GHT$(X1$,2) ELSE X$=RIGHT$(X1$,3
)
290 IF LEN(Y1$)=3 THEN Y$="0"+RI
GHT$(Y1$,2) ELSE Y$=RIGHT$(Y1$,3
)
300 Q$=X$+Y$
310 B=RND(7)-1: IF LEN(A$(B))>24
9 THEN 310
320 A$(B)=A$(B)+Q$+CHR$(32): RET
URN
330 FOR N=0 TO 6: K=INSTR(A$(N),
Q$)
340 IF K>0 THEN A$(N)=LEFT$(A$(N
),K-1)+MID$(A$(N),K+7)
350 NEXT
360 J=RND(7)-1: IF A$(J)="" THEN
 360
370 K=LEN(A$(J))/7: H=RND(K)*7+1
: Q$=MID$(A$(J),H-7,6)
380 X=VAL(LEFT$(Q$,3)): Y=VAL(RI
GHT$(Q$,3)): GOSUB 310: GOTO150
390 POKE 65494,0: GOTO 390
400 REM * ------------------- *
410 REM * GAME SEQUENCE
420 Y=RND(16)*10+7: LINE(0,Y-1)-
(6,Y+9),PRESET,B
430 Y1=RND(16)*10+7: LINE(5,Y)-(
7,Y+8),PSET,BF
440 Y=Y+4: Y2=Y: X=3: X1=X: B=4:
 LINE(175,Y1)-(177,Y1+8),PSET,BF
: Y1=Y
450 Z$=INKEY$: PSET(X1,Y1,5):PSE
T(X,Y,0)
460 IF X>179 THEN POKE 65494,0:
PLAY "L1": GOTO 460
470 IF B=1 AND PPOINT(X,Y-1)=0 O
R B=2 AND PPOINT(X,Y+1)=0 OR B=3
 AND PPOINT(X-1,Y)=0 OR B=4 AND
PPOINT(X+1,Y)=0 THEN 560
480 IF Z$=CHR$(94) THEN B=1 ELSE
 IF Z$=CHR$(10) THEN B=2 ELSE IF
 Z$=CHR$(8) THEN B=3 ELSE IF Z$=
CHR$(9) THEN B=4
490 X1=X: Y1=Y
500 IF B=1 THEN GOSUB 520 ELSE I
F B=2 THEN GOSUB 530 ELSE IF B=3
 THEN GOSUB 540 ELSE GOSUB 550
510 GOTO 450
520 Y=Y-2: RETURN
530 Y=Y+2: RETURN
540 X=X-2: RETURN
550 X=X+2: RETURN
560 PSET(X,Y,5): B=4: Y=Y2: X=3:
 GOTO 450: END
```

Program Listing 1. Mazemaker

This program is available on our Instant CoCo cassette. See the Instant CoCo ad elsewhere in this issue.

picking a cell from the 17- by 17-cell grid inside the black square. This cell turns white, beginning a network of white cells that snakes along for either an unfixed number of moves or until the pathway reaches a dead end of white cells.

Mazemaker recognizes three kinds of cells: black cells where nothing has happened, white cells with the potential for starting new branches of the network, and white cells that are already a part of the network. Every white cell is stored in a set of array strings—A$(0) to A$(6). When the program needs a new starting point, it examines the strings. If its random choice is surrounded by white cells, it eliminates the coordinates of that particular choice from the string, preventing the repetition of a pointless selection.

Running Mazemaker

Line 120 contains POKE 65495,0, which makes the program run faster on newer models of the CoCo. It also disables the computer's ability to communicate with peripherals, such as printers and cassette recorders. The program has a "slow poke" in line 390 so that a complete run of the program returns the computer to its normal setting. If you interrupt the program's run to move onto other activities, type POKE 65494,0 and press the enter key.

Mazemaker counts the white cells it creates and goes to line 390 when they are complete. This line is an endless loop; you must press the break key to exit the program. When you run Mazemaker for the first time, take a look at the maze before you erase it forever. Choose any cell on the left wall and any cell on the right wall. In tracing a line from one to the other, you can see that only one path runs between them (without doubling back). The same is true of any two cells anywhere in the maze.

Mazemaker's 17- by 17-cell maze is relatively easy to solve because of the bird's eye view it provides. To make it a little more interesting, try the game that begins at line 420. To run the game, enter 390 POKE 65494,0: GOTO 420. Then type "RUN." When the maze is complete, the program chooses two cells at random, one on each side, and opens them to the outside walls. The left wall opening sprouts a crescent-shaped protrusion, and a dot races out of it to the right. The object of the game is to direct this dot with the cursor keys through the maze to the wall opening on the other side. The hitch is that the dot never stops moving. If you let it run into a wall, it appears back at the starting position and you must start over again. When you make it through the opening in the right wall, you'll hear a repeating tone signifying that you've won.

Some ideas for customizing Mazemaker to suit your own needs include writing a printing routine or a multi-maze generator, and designing a round maze, a three-dimensional maze, or a maze with one true path to its center.

Next month, we'll explore the Knight's Tour, a millenial puzzle. ■

Address correspondence to Richard Ramella, 1493 Mt. View Ave., Chico, CA 95926.

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See List of Advertisers on page 89

The Learning Page

by Nancy Kipperman

TANDY'S COMMITMENT TO EDUCATION

Have you ever wished that you could walk into a store and purchase a package of educational software with a guarantee that it would turn your children on and teach them something worthwhile as well? Wouldn't it be great if the kids could try it out before you buy it?

The Tandy Home Education Systems (T.H.E.S.) Division now offers you just that service at home. Although its primary purpose is to reach families who aren't yet comfortable going into a store to buy a computer system, present CoCo owners are included in this marketing effort.

Current Color Computer owners who wish to upgrade their machine through the T.H.E.S. Division can do so if they live in one of the target areas now open. The cost to upgrade is the same as is listed in the Radio Shack catalog plus installation. The total price depends on what additions you make to your system. The T.H.E.S. Division offers six software packages ranging from $125 to $300 each. All programs are on disk, so you'll need a disk drive.

Tandy Color Computer owners who have a 64K computer, Extended Color Basic, and a disk drive and do not need any upgrade or new items will be able to purchase these software packages through a special catalog, which they will receive in the mail, or by writing to the Tandy Home Education Systems Division, 1301 West 22nd Street, Suite 400, Oak Brook, IL 60521.

Present CoCo owners who wish to upgrade their systems to 64K can receive a disk drive, two deluxe joysticks, a telephone modem, modem cable, Color Basic Programming manual, Logo package, Vidtex, delivery and installation, five free hours of CompuServe, three free months of CompuShop, one free hour of Dow Jones News Retrieval, and three blank disks, plus a choice of two out of six software packages. An alternate offer includes a dot-matrix printer and word processing (Scripsit) as well.

The six software packages are the result of the efforts of the T.H.E.S. software development team and leading educators and software developers. The idea is that each family can choose the packages best suited for the ages of its children.

The preschool package by Spinnaker offers Kids on Keys, Alphabet Zoo, Kindercomp and Facemaker. CTW Software Group and Tandy collaborated on the K-2 package, which includes Play with Language, three word and reading activities to develop comprehensive skills (Picture Place, Roll-A-Word, and Bagasaurus); Hands On; and Color Math. For the elementary grades (3-5), the emphasis is on developing quick thinking and planning and includes Taxi, Star Trap, Peanut Butter Panic, The Factory, The Pond, Teasers by Tobbs, and Color Math. These were developed by CTW Software Group, Sunburst, and Tandy.

For middle school grades (6-8), CTW Software Group and Tandy offer Creative Exploration, which requires quick thinking and interaction. This includes Grobot (reaction skills), Time Bound (historical facts), and Slipside (strategy). Also included are Typing Tutor, Sands of Egypt (strategy and graphics), and CoCo Extravaganza (50 programs). The high-school package by CBS Software offers Mastering the SAT and Success with Math.

The sixth software package is for the family and contains Infocom's Seastalker, an interactive text adventure game; Color Profile, an electric filing system; and Spectaculator, a family budgeting program.

T.H.E.S. will offer more software soon. A good software package, according to Julie A. McGee, director of software development and marketing, is one that "has a high motivational level built into it, provides educational value as well as enjoyment, and has a reuse potential so that the user doesn't tire of it or solve it quickly."

These software packages will only be available to CoCo owners through the T.H.E.S. program and cannot be purchased as packages in Radio Shack stores.

The key to this whole effort is reaching people in their homes, offering support and training, and answering questions. Tandy is most interested in reaching people who have never used computers and is offering demonstrations of the use of computers in education to school-parent organizations and presenting computer shows to students. An opportunity is provided for parents to respond if they are interested in a Tandy computer-management consultant coming to their home for a free demonstration. The cost of the complete package is less than $1,500.

Tandy anticipates extending its marketing area to cover the whole country within three years. The computer-management consultants have been drawn from a variety of backgrounds but all have some sales experience. As one of them said, "This is an exciting package to sell. As soon as I hook up the computer, I attach the modem and access CompuServe. People can't believe that it's so simple and that they're now talking to another computer. Then I let one of the kids begin to play with the software and sit back to answer the parents' questions. People feel free to ask me much more in their home than they would if they were in a computer store."

So, the next time someone asks you, "Should I buy a computer for my family?", feel free to pass the buck to the Tandy Home Education Systems Division. They plan to have the answers.

On another note—this column will provide a forum for sharing developments in the field of educational software and innovative computer use for both classroom and home education. Please participate by sending your experiences, ideas, and comments to me in care of *HOT CoCo,* 80 Pine St., Peterborough, NH 03458. ■

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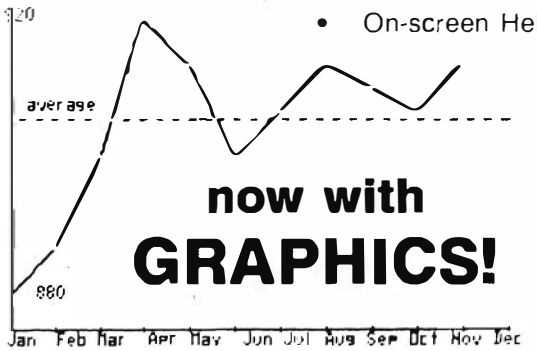

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68Ø9 On Line

Making The Most Of CompuServe

by Bobby Ballard

As the winter winds blow and the snow piles up outside, I want to show you some great reasons to stay inside and warm in front of your Color Computer. I'll tell you how to take care of your banking, shopping, and mail; plan your vacation; attend a forum; and even purchase software without leaving home.

All this is available through CompuServe. I've discussed CompuServe in the past, and this month I'll give you an overview of its services. In a future column I'll deal with some of CompuServe's expert, time-saving features. Now, let's see why telecommunicating is a great winter sport.

CompuServe continues to grow each month. Just when I think they've covered everything, my latest issue of *Online Today*, Compuserve's monthly print publication, arrives announcing more services and features.

You receive a one-year subscription to *Online Today* when you become a member of CompuServe. It is a glossy, standard-sized magazine in full color with reviews of software and hardware, as well as up-to-date information on CompuServe and other telecommunicating topics.

The world's largest on-line Color Computer club is found on CompuServe. The Color SIG (special-interest group) is run by a SYSOP (system operator), Wayne Day, just like a private bulletin-board system. Wayne has put together a large collection of information, programs, and text for all CoCo nuts.

Some of the special areas and databases for the CoCo include OS-9, Flex, telecommunications, business, utilities, graphics, music, games, and MC-10 programs. The SIG also includes a help file for new users.

The Color SIG has a conferencing mode for conducting live, real-time conversations with other CoCo owners. A regular feature includes guest software and hardware developers discussing their latest revisions or answering questions about the Color Computer. So, even if your car is snowed in or you live in a remote area of the country where software authors tend not to gather, you can still be directly involved in the CoCo world.

Other SIGs

CompuServe can supply ski buffs with daily updates on the major slopes in the U.S. The American Ski Association supplies the updates on the Ski SIG.

If skiing is not your bag, how about multiplayer games, cooking, education, travel, or sports, to name a few topics of other SIGs. There is also the Author's SIG for writers. Groups involved with golf, music, working at home, ham radio, law, and literature have their own SIGs, too.

Services

No matter what your interests are, CompuServe has some service to aid you. If you're interested in travel, but not in joining a SIG, you'll find some businesses there to help you with everything from planning to booking. Also on line are the Department of State, the Official Airlines Guide, and the Pan Am Travel Guide.

CompuServe provides more than one service to interests such as taxes, business, medicine, stocks, teaching, soap operas, games, aviation, news, weather, mining, handicapped services, electronics, adventure, and blackjack, among many others.

One of the most popular features, according to CompuServe, is CB Simulator. It works like a CB radio, letting you exchange information or opinions by typing at your keyboard. CB Simulator has special commands to change channels, check your terminal status, identify to whom you are talking, and exit the mode. You could have a conversation with any number of other members calling from other states and cities. This translates into low long-distance communication costs for you, especially if you access CompuServe late at night when connect rates are low.

Also attracting much attention for CompuServe is the Electronic Mall, where you'll find vendors for a variety of products ranging from Heathkit computers to Bloomingdale clothes. You can order any number of products or just download information for comparison shopping. The Electronic Mall offers computer users supplies, peripherals, and books from vendors such as Digital Research, Novation, McGraw-Hill, Waldenbooks, and CW Communications, publisher of many computer magazines including *HOT CoCo*.

Finally, CompuServe offers general-interest services such as on-line news wires, stock quotes, national and international AP weather, and the Academic American Encyclope-

dia. Several banks, including the Horizon Home Bank, Huntington National, Shawmut Bank of Boston, and United American Bank, provide services through CompuServe.

There are more than 600 services available on CompuServe, along with electronic mail and personal computing space for storing large programs or blocks of data. I will go into greater detail about specific features and services in future columns.

Membership Information

If I've excited you about telecommunicating, you can contact CompuServe at 5000 Arlington Centre Blvd., Columbus, OH 43220. Call them toll-free at 1-800-848-8990, or spend your own dime by calling 1-614-457-8650.

Radio Shack sells the Universal Sign-Up Kit for $19.95 (catalog number 26-2224), which will get you on line immediately.

CompuServe rates vary according to your established baud rate and the time of day. Prime rates are higher for day hours at 1,200 baud. At night the rate for 300 baud drops below $7 an hour.

If you haven't bought a modem yet, look for one that includes a CompuServe sign-up. Many vendors include it as a premium.

I invite you to get in on the fun and stay warm telecommunicating the winter away. ■

Address correspondence to Bobby Ballard, 1207 Eighth Ave. 4R, Brooklyn, NY 11215 or contact him through CompuServe, CIS ID 72746.2373.

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Doctor ASCII

by Richard E. Esposito, Jesse W. Jackson, and Ralph E. Ramhoff

Having technical difficulties? Consult the Doctor for an answer. Due to the volume of mail Doctor ASCII receives, we cannot guarantee that your query will be published. Please send a self-addressed, stamped envelope with all letters to Doctor ASCII c/o HOT CoCo, *Pine St., Peterborough, NH 03458.*

Q • How can I find out the required start, end, and EXEC addresses to save cassette machine-language programs to disk? Are there are any books or magazines that list POKEs and their uses? *Chris Buffett, Grand Bank, NFLD, Canada.*

A • First, CLOADM the program; then PRINT PEEK(487)*256 + PEEK(488) gives the start address, PRINT PEEK(126)*256 + PEEK(127) gives the end address, and PRINT PEEK(157)*256 + PEEK(158) gives the EXEC address. If the start address is below 3584, you need Tapefix from "Disk Utilitites," *HOT CoCo*, September 1983, p. 134, because the program otherwise interferes with Disk Basic's pointers. Microcom Software, P.O. Box 214, Fairport, NY 14450 markets *POKEs, PEEKs, 'N EXECs* for $8.

Q • I have a CoCo 2 with 64K, one disk drive, and a DMP-120 printer. I have written a program for my store that provides a running inventory, rental status, and profits. I can't figure out what the optimum CLEAR value should be in order to hold the maximum amount of information in RAM. I'm using three two-dimensional string arrays like A$(5,N) with 32 characters per cell maximum, two two-dimensional numeric arrays like M(5,N) and four single-dimension arrays like X(5).

What is the largest value for N and what CLEAR value must I use to get enough string space? *Al Walser, Monroe, WA.*

A • There is a formula that will give N and the CLEAR value, however, solving your problem this way can lead to other problems if the program ever needs to be modified. I'll first tell you how to calculate N and the CLEAR value and then I'll discuss a more flexible method of solving your problem.

To compute N you need the amount of free memory (total memory minus your program size of Basic's pointers and stack), the amount of memory taken by each of the N entries, and the additional memory space used by your program. To obtain the total free memory, load your program and type "PRINT MEM." This will print the number of free memory bytes on your screen. Remember, you can obtain additional memory by using a PCLEAR 1 before you load the program. Each of the string arrays is in the form of A$(5,N), so for each N there are five elements. Each element contains a length pointer (1 byte) and the data (up to 32 bytes) plus a variable pointer (2 bytes). Therefore, the total string space per entry is 35 bytes/element * 5 elements/array * 3 arrays/entry, or 525 bytes/entry of string space. Each numeric element requires 5 bytes plus one variable pointer for the entire array (2 bytes). Therefore, the memory space needed per entry for the two-dimensioned numeric array is 5 bytes/element * 5 elements/array * 2 arrays/entry + 4 bytes/entry (for pointers), or 50 bytes/entry + 4 bytes.

The single-dimensioned arrays take a fixed amount of space: 5 bytes/elements * 5 elements/array * 4 arrays + 8 bytes of pointers, or 108 bytes. Totaling this gives you 575 bytes/entry + 112 bytes. The last piece of data that you need is the additional memory required. You must count all your string variables and all your numeric variables not included in the above arrays. For string variables you need to know how long each one will be (maximum). The memory space needed for the string is the length + 1 byte for the last pointer and + 2 bytes for the variable pointer. For each numeric variable you need 5 bytes for the data and 2 bytes for the variable pointer. By adding these two numbers together you get your total additional memory requirements.

To compute N you need to subtract your total additional memory requirements and the 108 bytes from the number obtained above from your total free memory. I recommend reserving 200–300 bytes in addition to allow for some expansion room for your program and for any errors in the computation. The number left after the subtraction is the total memory available for your individual entries. To determine the number of entries that will fit, divide it by 575. This gives you N. To get the CLEAR value, multiply N by 525 bytes/entry. You can probably use a smaller number since all your strings are not 32 characters long. To find out how much longer you can go, you need to determine how many bytes out of the 32 bytes/entry are not being used.

The more flexible, and I believe more elegant, solution is to use one direct-access file for your data rather than trying to keep chunks of data in memory. Your disk drive is a random-access device, which means that it can read record 100 and then go back and read record 10. This random-access feature is what makes a disk system more powerful than a cassette one for data manipulation. Using direct access allows you to do sector-by-sector input and output with your data file. You should read Chapter 7 of your disk manual and understand it thoroughly before trying this.

Q • I own a 16K Color Computer 2, which I would like to upgrade to 64K. After reading "64K Modification" (*HOT CoCo* July 1983, p. 44), I removed the cover and found that there are no jumpers and no positions labeled 64K. Without more information I don't want to use the two program listings for fear of erasing the ROMs. Do you have a procedure for upgrading my computer? *Robert G. Karl, Goose Creek, SC.*

A • Your machine is a Color Computer 2, which did not exist when the upgrade article was published. The procedure for upgrading is as follows: Remove the eight 16K chips from sockets U14 to U21. Solder a jumper wire connecting the two solder pads to the right of W1. Install the eight new 64K RAM chips into sockets U14 to U21. Unless you have experience soldering PC boards, *DO NOT* attempt this yourself, have a qualified technician do the soldering for you. As there seems to be some confusion concerning ROMs and RAMs, I am including a short glossary of commonly used computer memories.

- **ROM—Read-Only-Memory:** This type of memory cannot be written to. These chips are preprogrammed at the factory.
- **PROM—Programmable Read-Only Memory:** This type of memory requires special equipment to allow your computer to write to it. Once they are written, they cannot be altered.
- **EPROM—Erasable Programmable Read-Only Memory:** This type of memory requires special equipment to allow your computer to write to it. A window in the top of the chip allows

it to be erased and reused by exposing it to an ultraviolet light. There are several varieties of EPROM programmers for the CoCo.

- **Dynamic RAM—Dynamic Random-Access Memory or Dynamic Read/Write Memory (RWM):** Use of this type of memory chip is widespread throughout the computer industry. These chips require a refresh cycle from the computer to retain their data. On the CoCo the 6883 synchronous address multiplexer (SAM) chip handles the refresh.
- **Static RAM (or RWM)—Static Random-Access Memory:** These chips are somewhat more expensive and less dense than the dynamic variety and have only marginal advantage in that they do not require a refresh cycle.

Q • I hope I have a simple question that needs only a simple answer. I own a fawn-colored CoCo (not a CoCo 2), Radio Shack drive 0, and 1, and an Epson MX-80 printer with a Micro Works Pi-80C serial-to-parallel interface. I purchased a program from Radio Shack called Disk Graphics. The program works great with my CoCo and monitor. However, I bought the program because I need a printed copy of the graph. This program is supposed to send the display screen to the printer, but all I get is garbage! I had the same problem with Disk Scripsit. This patch corrects the problem of Scripsit:

```
LOADM"DOS/BIN"
POKE &HEBC,&H8D
POKE &HEBD,&H06
POKE &HEBE,&H12
SAVEM"DOS/BIN",&HE41,&H1EA0,&H1050
```

This did not work with Disk Graphics. Do you have a patch that will make this program work with my Epson printer? *James R. Demers, Chicopee, MA.*

A • Sorry, no simple answer for you, James. However, a simple answer could be purchasing DynaCalc, which is available with graphics! DynaCalc (Computer Systems Center, 13461 Olive Blvd., Chesterfield, MO 63017) is a spreadsheet program that can present entered or calculated worksheet data in the form of line graphs, bar graphs, and pie charts. But since it's about $100, I would call that an alternative solution, considering the following possibilities.

Even though you think you have the same problem with Scripsit as with Disk Graphics, you don't. Your problem with Scripsit was the serial format, the problem with Disk Graphics is that Epson and Radio Shack graphics codes are different, though the format problem may still exist there, too. Your Epson printer requires an escape sequence (esc K n1,n2, or esc L n1,n2) to toggle it into high- or low-resolution graphics mode and inform it as to how many horizontal columns are allowed (n1 *256 + n2). Radio Shack printers have only one mode, requiring a code of a single byte $12 (DC2).

If Disk Graphics saved its pictures in binary form, you could use any graphics-dump program that works with your Epson printer, but I don't think Disk Graphics does that. Try this: Call up a chart on Disk Graphics, return to the main menu, and exit to Basic. Type in and run the following program.

```
10 CLS
20 INPUT" PMODE SELECT < 0-4 > "
;M
30 INPUT" PAGE  SELECT < 1-8 > "
;P
40 PMODE M,P: SCREEN 1,1
50 IF INKEY$="" THEN 50
60 GOTO20
```

Use combinations of graphics modes and pages to try to find your picture. If it remains after exiting Disk Graphics, you can use a screen-dump program that works with Epson printers.

If you want to get Disk Graphics to work with the Epson from within the program, you'll have to disassemble the graphics-dump portion, looking for the Radio Shack printer escape sequence. When you find that, you'll have to patch the code in for your Epson escape sequence. Since this isn't a one-for-one substitution, you'll probably have to jump out of Disk Graphics to an unused RAM area for your patch, then jump back into Disk Graphics just after the Radio Shack sequence.

Q • If you have Disk Basic 1.1, you are instructed to execute Sands of Egypt by entering the command "DOS." This command is not documented in the Radio Shack disk manual. What is this command? What does it do? *Joe S. Garzik, Greenville, NC.*

A • The DOS command was added to make it easier to boot the CoCo into OS-9. Radio Shack's OS-9 package comes with two disks, one containing the boot loader, the other the real OS-9 disk. The boot supplied on the disk is simply a machine-language program that reads in the true boot loader from the second disk, giving us a pair of boots! Seriously, remember Disk Basic and OS-9 disks have different file structures and Radio Shack didn't want to leave those with Disk Basic 1.0 out of the OS-9 market. I think they put in the DOS command to save disks, not because we're too lazy to do a two-disk boot!

The DOS command reads track 34 of the disk in drive 0 into memory starting at &H2600, and then EXECs it at &H2602. Here is a program that lets you put a position-independent code (PIC) machine-language program on a freshly formatted disk so that when you type DOS, it loads and EXECs for you! Please note that the start address must also be the transfer (EXEC) address, and the program must be 4,094 bytes or less.

```
10 CLEAR 700: A$=STRING$(128,255
):B$=A$
20 PRINT" INSERT FRESHLY FORMATT
ED DISKETTE IN DRIVE 0 "
30 INPUT"   PRESS A KEY WHEN REA
DY ";SA
40 INPUT"START ADDRESS ";SA' MUS
T ALSO BE TRANSFER ADDRESS
50 INPUT"END ADDRESS   ";EA
60 IF SA-EA >4094 THEN 500
70 DSKI$ 0,17,2,A$,B$
80 IF INSTR(66,A$,CHR$(255)) <>6
6 THEN 600
90 IF INSTR(67,A$,CHR$(255)) <>6
7 THEN 600
100 MID$(A$,66,2) = STRING$(2,20
1):SA=SA-2' ADJUST START ADDRESS
110 DSKO$ 0,17,2,A$,B$
120 FOR SE=1 TO 18
130 VA=VARPTR(A$):VB=VARPTR(B$)
140 A0=PEEK(VA+2)*256+PEEK(VA+3)
:B0=PEEK(VB+2)*256+PEEK(VB+3)
150 FOR I=0TO127: POKE A0+I,PEEK
( SA +(SE-1)*256+I ): NEXT I
155 IF SE=1 THEN POKE A0,79:POKE
 A0+1,83'FIRST TWO BYTES = " OS"
160 FOR I=0TO127: POKE B0+I,PEEK
( SA +(SE-1)*256+I+128):NEXT I
170 PRINT"TRACK 34, SECTOR ";SE:
PRINTA$,B$
180 DSKO$ 0,34,SE,A$,B$
185 IF (SA+SE*256) >EA THEN 200
190 NEXT SE
200 PRINT"DONE "
210 END
500 PRINT" FILE LENGTH EXCEEDED"
: GOTO40
600 PRINT" TRACK 34 HAS FILES":
GOTO20"
```

Reader's Forum

EDTASM + Control

Here is an easy way to control the cassette motor and audio while using Radio Shack's EDTASM+ ROM pack.

First, enter Z-Bug. Then, type "B" and press the enter key to enter the single-byte mode. To turn on the cassette motor type:

- FF21/ (this will prompt the current value of this byte)
- 3C and enter (turns on cassette motor)
- To turn off the cassette motor repeat above instructions, but type 34 instead of 3C.

To turn on the audio type:

- FF01/ (this will prompt current value of byte)
- BC and enter
- FF23/
- BC and enter (cassette audio will now be on)

To turn off audio repeat above instructions, but type B4 instead of BC.

Note that if you return to the edit mode the audio will be automatically shut off. So perform all tape alignments and adjustments while in Z-Bug.

James McDowell
Burlingon, VT

Secret Algorithm

This drawing-board program uses the right joystick to move a cursor around the screen, as do other drawing-board programs. I have added an algorithm that moves the dot around the screen faster in correspondence to how far you can move the joystick. This feature allows for more accurate drawings, and you spend less time correcting errors.

The following listing is my secret algorithm in a simple program that you can elaborate on or modify.

Warren Hyde
Miami, FL

```
10 PMODE 4,1:PCLS
20 INPUT"SPEED (FAST:1 - SLOW:10
0)";S
30 SCREEN 1,1
40 A=INT((JOYSTK(0)-32)/5):B=INT
((JOYSTK(1)-32)/6)
50 IF ABS(A)=A THEN 70
60 A$="M"+STR$(A)+","+STR$(B) :
GOTO 80
70 A$="M+"+STR$(A)+","+STR$(B)
80 FOR X=1 TO S:NEXT X
90 DRAW A$
100 GOTO 40
```

Color Basic TIMER

The absence of the TIMER function in Color Basic forces many programs to use loops and counters for timing, an unreliable procedure because it depends on the speed of the Basic interpreter, which is far from constant. More accurate timing capability is, however, available in Color Basic from the duration countdown of the SOUND statement. The trick is to activate the countdown without activating sound.

To do this, first POKE 65283,PEEK(65283)OR1. This POKE activates a machine-language interrupt handler in Color Basic. You can now turn on the timing countdown, so sound might not be used during timing.

POKE 141,255:POKE 142,255 turns on the countdown. Think of this as equivalent to the statement TIMER = 0 in Extended Basic if you are doing program conversions. Replace TIMER thereafter with the formula (65535-PEEK(141)*256-PEEK(142)). In original programs, you will probably want to use (65535-PEEK(141)*256-PEEK(142))/60 as a count of elapsed seconds. (The Extended Basic version would read TIMER/60.)

This method of measuring elapsed time differs from TIMER only in two minor respects. When TIMER reaches its limit of just over 18 minutes, it automatically resets to zero and continues to time. The countdown in Color Basic will simply turn itself off after the maximum time period. Also, TIMER is activated by Extended Basic when you turn on your computer. After a while, its value is unpredictable by the human mind so it can be used in RND( ) to reseed the random-number generator. TIMER activated manually will not effectively reseed the random-number generator.

Ronny Ong
Arlington, TX

Speed Your Screen

This short program speeds the creation of your high-resolution graphics screens. It simply makes a 10-by-10 grid on your screen, eliminating the need to first draw on graph paper.

Brian Alsop
Trafford, PA

```
10 SCREEN 1,0:PMODE4,1:PCLEAR4:P
CLS
20 FOR I=0 TO 192 STEP 10
30 LINE(0,I)-(255,I),PSET
40 NEXT
50 FOR I=0 TO 255 STEP 10
60 LINE(I,0)-(I,192),PSET
70 NEXT
80 SCREEN 1,0:GOTO 80
```

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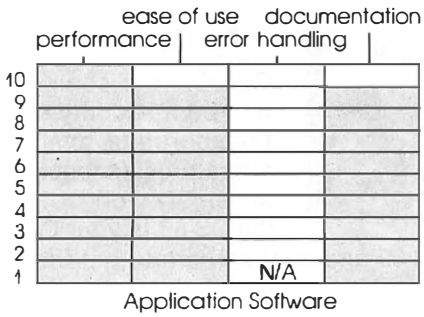
REVIEWS



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edited by J. Scot Finnie

Wizard
D. Dean Rector
2601 Bridalwood Drive, Apt. 4
Knoxville, TN 37917
16-64K, Telewriter-64
$16.95 cassette
(Program is disk compatible.)

by Scott L. Norman

Wizard is a program for Telewriter-64 devotees. It is a patch that outfits this favorite word processor with a brand-new video alphabet. The product has other benefits, too. If you study Wizard's documentation carefully, you'll be able to further modify the display to suit your typographical tastes. Even if you do nothing but install the patch as is, you'll learn a great deal about the way Telewriter is organized.

How It Works

Wizard is a short Basic program that replaces the stock character tables used by Telewriter with new ones. That's not as mysterious as it sounds. The character tables are nothing but a 756-byte chunk of RAM containing numerical codes that define how the video pixels turn on and off to represent the characters in Telewriter's repertoire.

Because Telewriter has two complete character sets, there is more than one table. One defines everything in a four-pixel-wide matrix, and another defines a matrix that is three pixels wide. The tables and character sets you use depend on the line length you choose for your video display, the capabilities of your television set or monitor, and your own taste. Dean Rector, the program's author, created complete upper- and lowercase alphabets, punctuation marks, and a new number 9 for both narrow and wide character sets.

Keep a few things in mind about this program. Wizard affects only the video display. The appearance of printed text depends on information stored in your printer's ROM and is not affected by any mucking around you do in the character tables. The program is also a modification to Telewriter-64, the current "all-ROM versions, all-RAM sizes" edition of the word processor. Although I have not tested Wizard with any of the earlier versions, I doubt very much that it would work with them—at least, not without a great deal of address modification.

Wizard uses DATA statements and their corresponding POKEs to

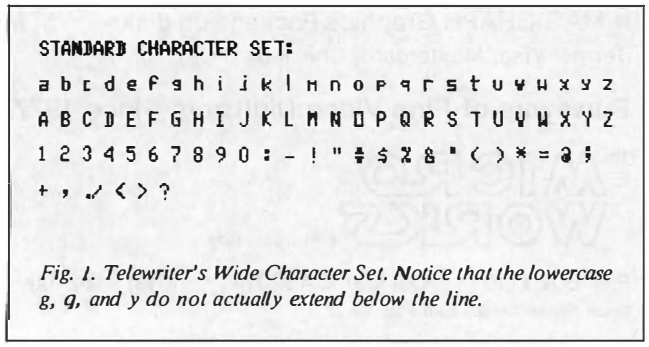


Fig. 1. Telewriter's Wide Character Set. Notice that the lowercase g, q, and y do not actually extend below the line.

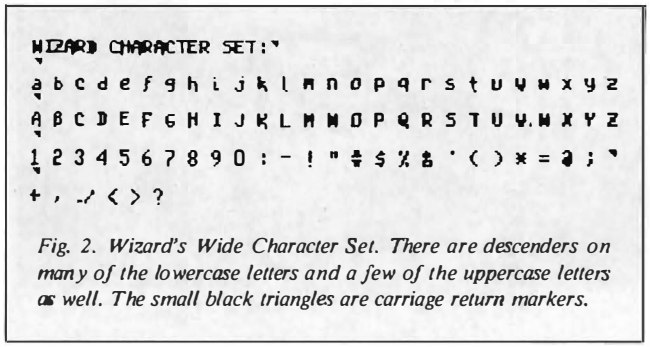


Fig. 2. Wizard's Wide Character Set. There are descenders on many of the lowercase letters and a few of the uppercase letters as well. The small black triangles are carriage return markers.

get character codes into memory. It can be used as either a run-time package—a separate program you invoke after you get the conventional version of Telewriter running—or a permanent modification to Telewriter itself. Neither the size of the text buffer, nor any other aspect of Telewriter's operation, is affected by the changes. Wizard's documentation contains complete instructions for both kinds of operation, and for using either a cassette or disk system.

Wizard performs RAM tests to locate the character tables before starting up. Their location is different for 64K computers than for 16K and 32K computers, and also depends on whether you are using disk or cassette. Telewriter might have been loaded with an address offset, as well; there is plenty of checking for the program to do.

How It Looks

Trying to describe a type font in print is similar to attempting to explain a spiral staircase without using your hands. Take a look at Figs. 1 and 2 for examples of the standard four-pixel-wide Telewriter-64 character set and the new one created by Wizard. Both photographs were taken from the screen of a nine-inch monochrome monitor.

The most apparent difference between the type styles is the lack of descenders (portions of the letters that extend below the line) in Telewriter's lowercase alphabet; look at the g and p, for example. The Wizard typeface has several descenders that drop one pixel below the line. This makes the text more readable, although it is still not as clear as the printed page. (Because most printers use a larger character matrix than the CoCo's video display does, they can devote two dots to descenders.)

The character set that Wizard produces has descenders where you might not expect them. For instance, the f, 1, and t have descenders. Some uppercase letters have descenders as well. In the instruction leaflet, Rector writes that he chose a calligrapher's freewheeling approach to designing his alphabet, primarily for reasons of proportion.

My first impression of Wizard's alphabet was that the letters had too much of an uneven look—as though they were hand-drawn, or as though a Hobbit had gotten into my computer. After using my modified copy of Telewriter for some major pieces of writing, however, I became much more comfortable with the new style. I think the new three-pixel-wide letters make 60-character lines more legible on a nine-inch monitor. The difference is less pronounced when I switch to a 13-inch screen.

"Perhaps best of all, you can customize Wizard to fit your own needs."

Wizard's typeface looks better on a 13-inch black-and-white TV screen, too, but for that application I still prefer to restrict Telewriter to a 51-character line with the wide character set.

I suspect that I'll end up customizing the typeface even more before I am completely satisfied. Wizard's documentation points out a pretty painless method. The scheme used to encode the on and off pixels in the character matrix is illustrated with a figure, and the text tells you how to find the RAM address of any character in the table if you want to do the modification POKEs while the program is loaded. Alternately, you could modify the appropriate DATA statement in Wizard's source code; it's reprinted in the leaflet.

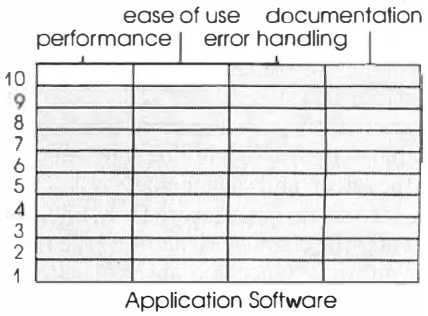
It Does More

Wizard makes another change in the Telewriter display: it generates carriage-return markers—the small black triangles in Fig. 2. These are not particularly useful when the word-wrap feature is turned on, except for counting blank lines between pieces of text. They can be handy if you use Telewriter to prepare program source code, however, because that's where a misplaced carriage return could have serious consequences.

You can also customize the video by changing the screen color of the editor and the speed of cursor movement. Replacing a pair of REM statements in the Wizard code does the job. I like the setting of the cursor, but I did welcome the opportunity to change the display background from buff to green. The original setup produces a large change in monochrome contrast when you shift from a Telewriter menu to the editor. After changing to green, I no longer have to ride herd on my monitor's intensity control.

The final customization option has to do with replacing Telewriter's standard line feed-code (ASCII 13, actually a carriage return) with something else, such as the ASCII 10 required by some printers.

I recommend Wizard for Telewriter devotees who want to do something nice for their hard-working word processor. Dean Rector clearly knows his way around Telewriter, and I think his program performs a great service. Perhaps best of all is the program's ability to let you customize it to fit your own needs.■



Easy-File
Mark Data Products
24001 Alicia Pkwy, 207
Mission Viejo, CA 92691
714-768-1551
32K, disk drive,
Extended Color Basic
80-column printer optional
$59.95

by Steve Brown

Mark Data Products is creating a library of application programs for the CoCo that work alike—a family approach that doesn't require the user to learn a new set of instructions with each program. (See *HOT CoCo*, June 1984, p. 24 for a review of Mark Data's Business Accounting System and July 1984, p. 98 for a review of the Order Entry System.) Easy-File is a database-management system that shares the menu-driven format and many of the features

of the other Mark Data business programs.

Performance

Easy-File comprises five separate programs. It lets you chain these programs together to operate file-handling functions without loading and reloading programs. When you run Easy-File, a set-up routine loads and executes Mark Data's Super Screen. (See *HOT CoCo*, January 1984, p. 40 for a review of Super Screen.) Super Screen is a screen environment that prints all computer output to the graphics screen instead of the text screen, allowing you a 52-character by 24-line working area.

Easy-File lets you build files as large as a disk with records up to 254 bytes long. With a one-drive system, it stores information directly on the program disk. If you have two disk-drives, Easy-File uses one drive for the program and the other for a data disk.

You enter data into Easy-File one screen at a time. The program prompts you for the information required by each field. You can change or correct data at any time, either during or after typing it. I'd like to see a full-screen editor in future modifications that lets you make changes or additions anywhere on the screen and save them.

To set up records with Easy-File, you enter the character lengths of the fields you want. Once you have formatted a file in this manner, all the records in the file retain that format. If you change your mind, the program also has a routine that modifies the layout of the fields. Easy-File can sort and print based on fields.

Easy-File can sort and select records by record number and by contents. When a file is written to the disk, it is assigned a sequential record number. Because you might not remember what record number you want, the program can also look for a name, a zip code, or a similar bit of data. Easy-File can search for exact-character matches or wildcard-character matches, such as Smithe, Smithson, or Smith field for Smith.

Easy-File has a clever and efficient approach for handling files. Once you flush out a file's records on disk, the program never rearranges them, even during sorting procedures. Instead, it opens an index file in which it writes the record numbers in an order that corresponds with whatever file-ordering functions you select. An index file becomes a reference for the rest of the program functions.

"I've examined four database programs for the CoCo in the last few months. Elite-File is the easiest to master and the one that best addresses my needs."

In addition to being clever, this routine saves you time. Easy-File can perform a five-level sort and handle more than 600 records. But it sorts directly from the disk file, requiring frequent and time-consuming disk accessing. It manages to save time because it never reshuffles the records on a disk. Instead it follows an index file. And Easy-File can store several index files at once.

Features

Easy-File has a feature its documentation calls a "delete" code that marks records for special handling. If you put a delete code into a record, Easy-File no longer accesses it during searches.

Suppose some members of your CoCo club temporarily cancel their subscriptions to the club newsletter while on vacation. If you had Easy-File to handle your mailing list, you could put delete codes on the travelers' name records to keep the newsletter from piling up outside their doors. But their name records would not actually be deleted from your file. When they return home, you could just remove the delete codes to start up their subscriptions again.

These are more like "ignore" codes because records aren't deleted, they're just passed over by the program. Delete codes permit a whole range of file-handling tricks. Most importantly, you can save records that have delete codes into an entirely different disk file. In other words, you can use delete codes as a criterion for record selection.

Easy-File offers several print-format options, including vertical or horizontal, and 80- or 132-column modes. You can imbed codes during the formatting procedure to send compressed characters to the printer that print 132 columns on an 80-column sheet. The program lets you establish three separate report formats for each file. Easy-File reporting has a mailing-label option for printing on standard $^{15}/_{16}$-inch gummed labels. In addition, it can automatically print names in last-name-first or first-name-last order. A record in your file might be recorded as "Smith, Joe," sorted alphabetically by Smith, and printed on mail labels or reports as "Joe Smith."

One of Easy-File's best features is the panic key. If you get lost while following the menus or become unsure of where you are going, you can press the down-arrow key to go back to the previous menu. Although Easy-File isn't difficult to use, database managers are unfamiliar to many of us. It's nice to be able to go back and double check once in a while to get your bearings.

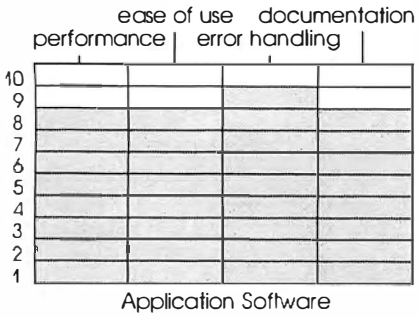
There are still other things that Easy-File can do. It lets you create a password for each disk file, a process that bars the program from accessing a protected file without your password. Easy-File can also arrange fields in a dollar-and-cents format and total them.

Summary

In reviewing software for the CoCo over the last couple of years, I've consistently found Mark Data's documentation to be among the clearest and most complete. Easy-File documentation maintains this high standard in three ways. It leads you through all the functions of its programs. It comes with demonstration files and report format already on the disk. It includes a name-and-address file and a household-inventory file on the disk. All you have to do is run through the manual, call up the formats, and start plugging in your data.

I've examined four database programs for the CoCo in the last few months. Easy-File is the easiest to master and the one that best addresses my needs. Its menu-driven format is a boon because the logical steps of the menu seem to come naturally.

Easy-File is what its name suggests. But it is also much more than that. It is a sophisticated database manager that offers CoCo owners as much flexibility as you can expect. Easy-File's documentation is superb; its demos are tools in themselves. If you need to better organize the information in your life, Easy-File might just be the best method. ■



Datalist
Computer Associates Inc.
P.O. Box 683
West Fargo, ND 58078
800-437-4757
32K, Extended Color Basic
$24.95 cassette
$32.95 disk

by John Ogasapian

Datalist is a well-conceived and easy-to-use database manager. It has all the standard, small database-management routines and doesn't take up much space in RAM. In fact, the program leaves a large portion of RAM for file contents.

When you start up Datalist, you don't need any extra POKE commands. For the cassette version, reviewed here, entering CLOAD and the RUN command twice does it all. Then you type in the size of the file you want to store. The program clears sufficient string space and displays the main menu, from which you can format a new file or load an old one. Once a file is in the memory, you can call up Datalist's other routines, including adding, deleting, sorting (with a fast machine-language subroutine), saving, listing, and printing.

With Datalist, you can print all or part of any number of records in a file, in horizontal-report and vertical mailing-label formats. The horizontal report print routine is designed for the Epson MX-80 and Gemini-10 printers and offers a choice of 10, 12, or 17 characters per inch.

This program is difficult to crash. Pressing the break key, which is easy to do accidently when you are trying to enter numeric data quickly, interrupts the program. But you can restore the main menu—without data loss—by entering GOTO 1. In fact, GOTO 1 is Datalist's all-purpose crash control, and it works very well.

"Datalist's documentation is well written and easy to understand, making the program a good bet for the novice. It's very easy to learn and use right away."

Pressing the clear key by accident merely invokes a "Redo" prompt. If you push the break key and then enter RUN, everything comes to a grinding halt. The key combination voids the memory and returns the program to its title routine.

Datalist wraps characters that can't fit on a line or in a field around to the

SUPPORT

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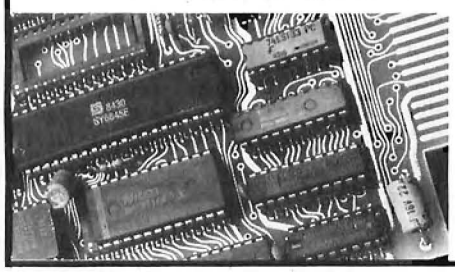
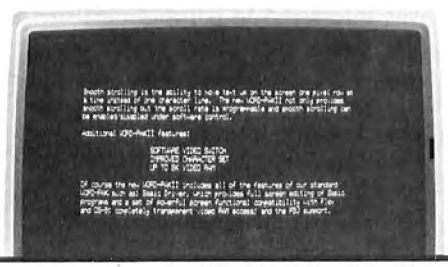
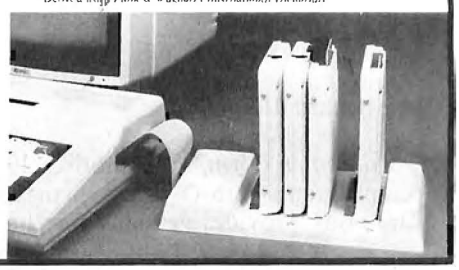






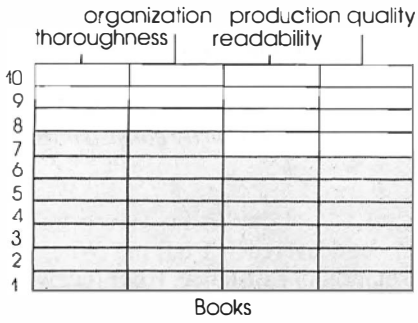
✓ See List of Advertisers on page 89

next *line* or field. For this reason, if your printer doesn't have condensed-print capability, you must be careful about the number of characters in each record. An inconvenient aspect of the program is that you have to reenter a record to correct or edit a single field once you have exited it.

In the print routine, Datalist sorts and sets up print runs with a "target-character" string search that requires a cumbersome set of operations. However, a main-menu routine scrolls your file vertically and numbers the characters, making the process easier once you are used to it.

Datalist's documentation is well written and easy to understand, making the program a good bet for the novice. The main-menu routines have secondary menus and prompts to guide you through commands. Datalist is very easy to learn and use right away. In addition, its documentation contains a tutorial that leads you through each routine with a six-record sample file.

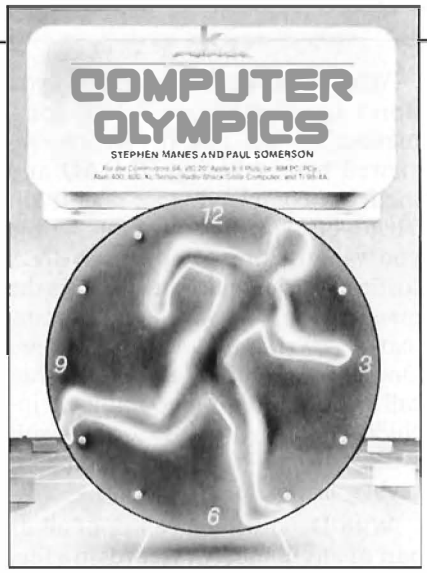
Considering its price, reliability, ease of use, and ability to handle anything that might reasonably be expected of a 32K database manager, Datalist is an excellent program. It might not run a mail-order business or keep track of all the books in a public library, but Datalist is an ideal database program for almost all home, college, and personal filing needs. ■



Computer Olympics
Stephen Manes and
Paul Somerson
Hard/Soft Press, Scholastic Inc.
703 Broadway
New York, NY 10003
212-505-3000
$4.95 softcover, 168 pp.

by Richard Ramella

Computer Olympics comprises 39 programs with Olympic themes. The book provides versions for the Color Computer and the MC-10. In reading the listings I found no MC-10-illegal commands or statements.



Computer Olympics. *Hard/Soft Press*

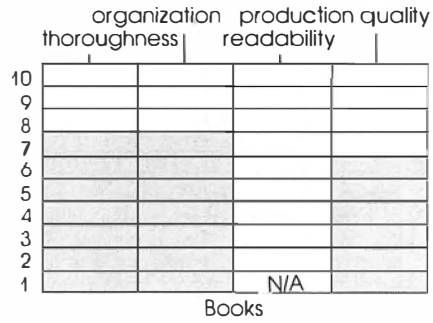
The listings are written in elementary Basic, so expect no sound or graphics, and little movement. The original versions are for the IBM PC and PCjr. Special sections following the listings provide changes for the CoCo. I entered several programs with changes for the CoCo and found no bugs.

One of the most complex programs, Basketball Action, is a kind of running commentary of a game whose action and scoring are determined randomly. Other titles present a fair idea of their content: Olympic Translator, How Long Is That Race?, and Carry the Torch, a text drawing of a torch.

Some programs' titles seem to promise more than they deliver. A View from the Blimp is in fact a series of words, such as hooray and rah, that represent an unseen crowd. Text graphics of diving competitions are the same each time—a simplistic, pseudo-animation.

Young readers will learn Olympic facts, get practice typing in short listings, and perhaps begin to learn programming techniques. As an adult, I was interested in comparing listings for 10 computer models.

Any work that manages to fit listings to different brands of computers tends to leave out some of the most interesting program features. But this book's wealth of simple material and low price make it a bargan. ■



BBS Log Book
Robert E. Ballard
Atmospheres
1207 Eighth Ave.
Brooklyn, NY 11215
212-788-6799
$5.95, spiral bound notebook, 77 pp.

by Jeffery S. Parker

The *BBS Log Book* will be familiar to amateur radio operators and people who use business phones. It is a log book designed to hold operating information for a bulletin-board service (BBS) directory and a personal phone directory.

The book has a three-section format: BBS log, a personal directory, and a telephone log. The BBS log helps you keep track of all the information necessary to contact BBSes, including access numbers, passwords, baud rates, messages, correct times, dates, and whether programs have been up- or downloaded.

The personal directory is printed on the divider between the BBS log and the telephone log. It contains columns for noting information about accessing databases such as The Source and CompuServe, and long-distance services such as MCI and Tymnet. You can also use it to keep track of security and control codes, and access numbers.

The final format is the telephone log, designed for regular telephone calls. This feature is handy for making a record of phone calls or keeping track of phone bills.

There are a couple of things to consider when using this book. The first is a question of security. With all my passwords in one place, I want to keep the book under lock and key at all times. Second, you must do a significant amount of telecommunicating for the book to really serve its purpose.

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COMING NEXT MONTH

Printers and disk drives are currently the hottest peripherals going for the Color Computer. If you already have or are considering purchasing one or the other, you won't want to miss the March *HOT CoCo.*

Our Doctor ASCII columnists, Richard E. Esposito and Jesse W. Jackson, give a rundown on what to look for when shopping for a printer. And they top off the article with a universal screen-dump program that adjusts itself to your dot-matrix printer.

Education Editor Nancy Kipperman has been on the phone to developers of CoCo educational software to find out what kinds of systems for which they are writing. The word is "get a disk drive," if you want to get the most out of educational software. Find out why next month.

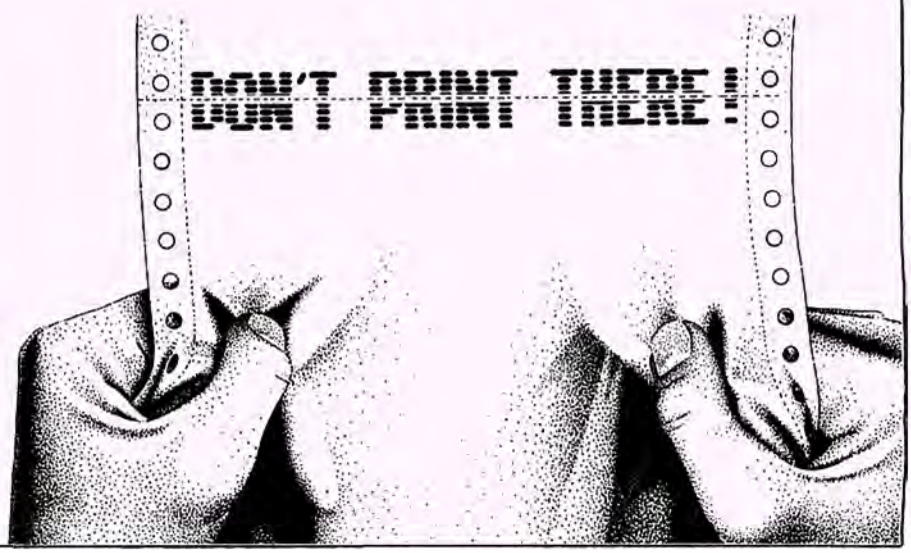
What does it take, dollar-wise and equipment-wise, to get on line? Bobby Ballard, our communications expert, says you don't have to spend a lot ot money to get started. See for yourself in March's 6809 On Line column.

POKEs, PEEKs, and EXECs let you access little, helpful programs built into your CoCo. John Majka's "Those Amazing POKEs" lists some of the more useful ones next month.

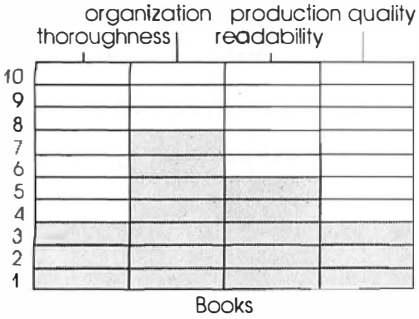
Cassette users will appreciate John Nicolettos' utility that lets you control your recorder from the CoCo's keyboard—no more plugging and unplugging cables or pressing the wrong buttons.

Bored with Basic? Baffled by Assembly? Maybe Pascal is the programming language for you. Reviewer Scott Norman takes an in-depth look at DEFT Systems' Pascal Compiler in next month's *HOT CoCo.*

See you in March.■



The BBS Log Book is a specialty item, which, if taken seriously and handled properly, can be very effective in tracking information essential for telecommunicating and long-distance phone calls. The information columns are laid out well and provide adequate space for entries. If the security question is seriously addressed, and a real need for such a book exists, the BBS Log Book could be a very handy addition to a personal-computing library.■



Introducing Logo
Peter Ross
Addison Wesley Publishing Co.
Reading, MA
$12.95, 249 pages

by Richard Ramella

The subtitle of this book notes it applies to several types of Logos, including Radio Shack Color Logo. Yet, on page 15 is a startling caveat in which author Peter Ross writes, "Radio Shack Color Logo has so many differences that you should not rely on any of the information given in the body of this book."

If you can't rely on any of the information, is there any reason to part with $12.95?

Though fascinating, *Introducing Logo* literally treats Radio Shack Color Logo as an afterthought—in an 11-page appendix. However, the serious Logo student will find a wealth of information in the book, and teachers using Logo will profit. Of particular interest is the possibility to sample and compare different Logos' capabilities.

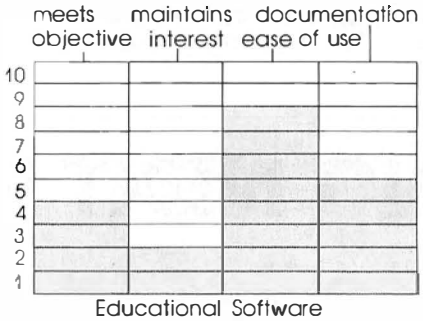
The beginner with Color Logo cartridge or disk would best look elsewhere for instructions. Many of the rudimentary program examples work in Color Logo. Many do not, and this frustrating. Why don't they work? Because they're in Terrapin Basic for the Apple II computer.

Author Peter Ross is an artificial-intelligence researcher at the University of Edinburgh, Scotland. His writing is precise, flowing, and friendly, and his introduction includes interesting short essays on programming as a tool for exploring ideas, history, artificial intelligence, and advice for teachers.

The lexicon of Logo is here. You can understand the topics even when the examples don't work, but later sections of the book go into areas of no use to Color Logo users.

The 11-page Color Logo appendix gives our favorite turtle its due. This appendix is a concise explanation of available commands.

I don't think this book will become an abiding reference work for the Color Logo user, but its ideas—if they can be translated—suggest interesting applications, no matter what form of Logo you may possess.■



Pre-Algebra I, Integers
Tom Mix Software
4285 Bradford N.E.
Grand Rapids, MI 49506
616-957-0444
16K, Extended Color Basic
$29.95 cassette
$32.95 disk

by James K. Hardy

Pre-Algebra I is a series of five Basic programs designed to help students work with algebraic expressions. Up to four students can use the system at the same time, and each can choose from nine skill levels and receive a performance report. All five programs follow the same format, so the system is easy to learn. As the title indicates, the programs deal only with integers, not variables.

Performance

The initial menu options offer four different quiz programs in which you must solve problems such as the following:

```
+4 - +4 = ? (Integer Quiz)
-3 + ? = -2 (Missing Number)
-1 + ?3 = 2 (Missing Sign)
-1 + +4 ? -2 + +6 (Compare Integers)
```

The skill level you select determines both the size of each number used as well as the number of values in each expression. You can also choose to answer from one to 50 problems.

You get two chances to answer correctly. If you do so the first time, you get credit toward the percentage correct. Giving the right answer the second try gets you a "correct" message, but no credit, and two failures displays the correct answer on the screen.

After you've answered all the questions, the progress report tells you the number of questions you answered correctly the first try, how many you got the second try, how many were wrong, and how long it took you to work all the questions.

The instructions and the examples for the Missing Sign program (like the one above) lead you to expect that the sign for one number in the given equation will be missing. Actually, the function (+, -, *, /) is left out. The resulting problem is an acceptable one, but the information about it is misleading.

There are also limitations concerning the types of problems generated. When the programs create equations using multiplication or division, the problem includes only two members, regardless of the skill level selected. In fact, on level 7 (which should generate all the functions), multiplication and division never appear together or with addi-

"Pre-Algebra I presents its problems in a simple drill format and makes no attempt at creativity."

tion and subtraction on the same side of the equation.

The Compare Integers program is the only one that uses functions involving multiplication or division on one side of the equation with addition/subtraction combinations, multiplication or division on the other.

Ease of Use

Because these five programs all work the same way, even beginning algebra students should be able to learn the system. There are some problems, though.

Sample problems use X as the multiplication symbol, but the actual problems use the asterisk (*). Those familiar with Basic should know that the asterisk represents multiplication, but others might not. Furthermore, it was difficult to distinguish between the * and the + on the screen.

A formula like +4 − −4 = is somewhat confusing. In a standard math text, the typeface for the subtraction function and the negative sign would be different and therefore easy to tell apart. Displaying one sign in reverse, or otherwise clarifying the difference, would be a help.

Because each program displays the same Tom Mix logo while loading, you can't tell if you've selected the correct program until you've answered all the initial prompts (your name, menu selection, number of problems, skill level, and so on) and you see the first problem.

Error Handling

Pre-Algebra is somewhat limited in its ability to handle errors. The programs won't let you select options not available from the menus, and you can't enter a value as an answer for each problem. However, you can enter characters other than numbers as answers, even when these would be improper choices. However, such an entry is merely considered a wrong answer.

The system also contains a few quirks. You enter your name after you load the program, but typing more than 32 characters will fragment the name into separate lines, and more than 39 characters generates a syntax error *when the* program tries to center and display the material.

In the Missing Sign program, the first five options from the problem-type menu appear and then disappear. And when the program generates a long equation as skill level 7, it produces a subscript-out-of-range (BS) error in 6040.

Documentation

Pre-Algebra I comes with a single photo-reduced sheet of instructions. While somewhat difficult to read, the material does tell you how to load and run the various programs in the system and outlines each program objective. The text is written for the teacher or parent and doesn't give the student much to learn from. A brief instruction set for sixth through eighth graders would be helpful.

Summary

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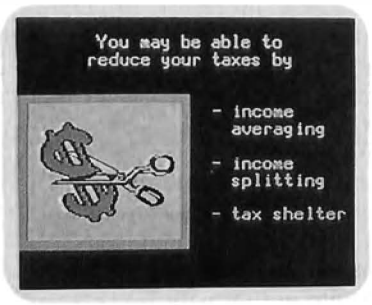

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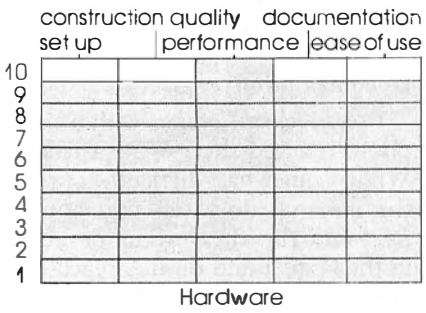
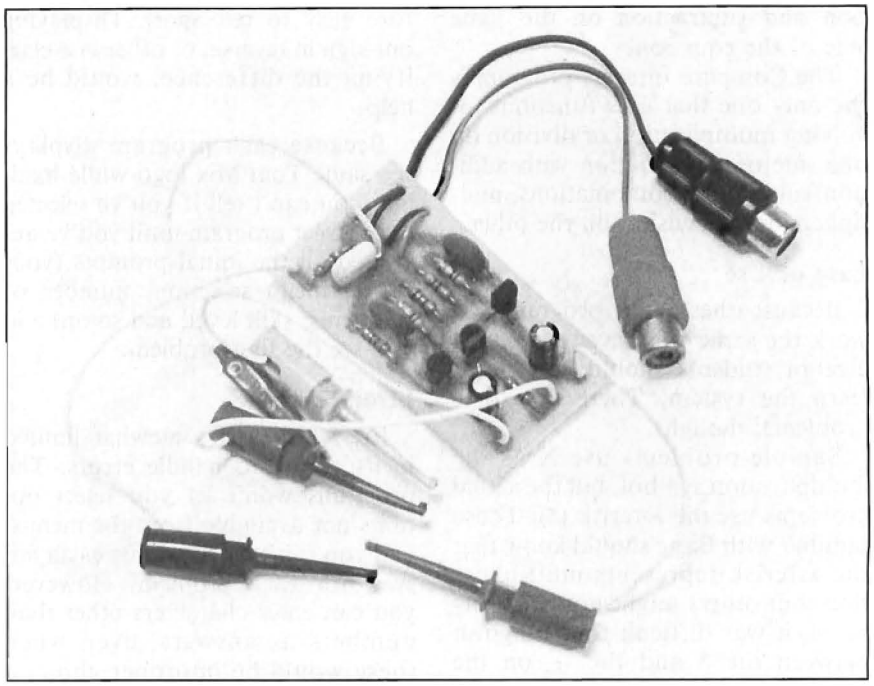
its problems *in* a simple drill format and makes no attempt at positive reinforcement or creativity. It doesn't teach the steps in solving algebra problems and offers little to hold a student's interest. This program probably isn't your best bet, unless you're working with highly motivated students.■





The Universal Video Driver. Mark Data Products

Universal Video Driver
Mark Data Products
24001 Alicia Parkway, 207
Mission Viejo, CA 92691
714-768-1551
All Color Computers
$29.95

by Peter Paplaskas
HOT CoCo staff

How can the Universal Video Driver (UVD) help you? Your Color Computer is designed to connect to a television set, which deprives you of the crisp, clean display of a color or monochrome monitor. The UVD lets you adapt any monitor to any version of the CoCo.

The Color Computer sends video to your TV through a radio frequency (RF) modulator. Monitors, on the other hand, use a voltage frequency known as an IF signal. If you try to use a monochrome monitor with the CoCo's RF modulator, all you'll get is blank screen. Mark Data's Universal Video Driver intercepts the IF signal before it gets to the RF modulator. Using your favorite word processor becomes an entirely new experience with the UVD and a monitor.

Installation

The UVD comes as a kit that is very easy to install, even for the novice. It attaches with color-coded test clips that create solderless connections. The kit comes with three wiring diagrams that cover all the CoCo's motherboard versions and a table that assigns a contact point to each color-coded clip. The kit connects to the audio, ground, chroma, luminance, and positive 5-volt power contacts.

The UVD installs a little easier in the CoCo 2 than in the other versions. You don't have to make connections to IC chips because of the improved circuitry in the CoCo 2's RF modulator. The other board versions require you to connect clips to pins on the video display generator (6847) and video mixer (1372) chips. To make these connections more secure, loosen the chips slightly before attaching the UVD's clips. Then reseat the chips.

There's a chance that you'll run into excessive brightness and contrast on a monochrome monitor. Mark Data includes instructions that eliminate the problem, simply and effectively. You have to remove one connection and move it to the ground contact. This doesn't occur with color monitors.

The UVD mounts with double-sided tape on top of the RF modulator in all board versions except the CoCo 2. It mounts on top of the 6847, 6822, and 74LS273 chips in the CoCo 2 because the RF modulator is mounted vertically and doesn't offer a secure mounting surface. The kit's two RCA-plug leads run through the hole for the CoCo's video output.

The New Look

It's not uncommon to encounter color artifacts when using PMODE4 graphics. But not with the UVD and a color monitor—the colors are crisp. I was impressed by the clarity of PMODE4 graphics on a monitor. I did, however, find color artifacts in the 64-column high-resolution mode of my word processor. I think this is caused by the vertical line density of the text characters. Adjusting the computer's clock-frequency trimmer should rectify the problem without causing any ill effects to the computer. If you use your CoCo for word processing, the UVD offers true clarity of text in 50- to 65-column formats on a monochrome monitor.

Audio output with UVD is strong without any indication that the adaptor loads down the CoCo's sound generator. If your monitor doesn't provide audio output, the UVD's documentation lists two good sources for speaker and amplifier kits that sell for under $12.

The Universal Video Driver offers a clear picture, a modest price, easy installation, and compatibility with all CoCos and monitors. If you've been thinking about setting your CoCo up with a composite video monitor, this is an adaptor you should consider.■

Game Tips

Shifting Sands

I've found the shovel, snake, canteen, torch, and the magnifier in The Sands of Egypt. I've wandered the pool area but can't seem to do anything else yet. I filled the canteen with water and can't seem to get a drink. Am I missing something?

Virgi Westcott
Bakersfield, CA

When draining the pool in The Sands of Egypt, the scepter can be used as a hook to pull the cover loose.

Michael Buksas
Gilbert, AZ

Trouble in Raaka-Tu

You can't get past the rug in Raaka-Tu nor the golden gates outside the temple. They're just there as decoys to distract the player from other things.

Jeff Mercer
Gainesville, FL

I can't seem to get past the gargoyle. I am a lover not a fighter. Give me a hint, please. Also, what good is the Ring of Motion when it seems to get you killed all the time?

In Shenanigans, how do you get past the snake?

Virgi Westcott
Bakersfield, CA

Dog in Bedlam

To get the red key in Bedlam, use the window hook to fish it out of the cabinet in the dispensary. The red key will unlock all red doors. To obtain the green key, which is in the electroshock therapy room, stand outside the room and type "Get key with window hook."

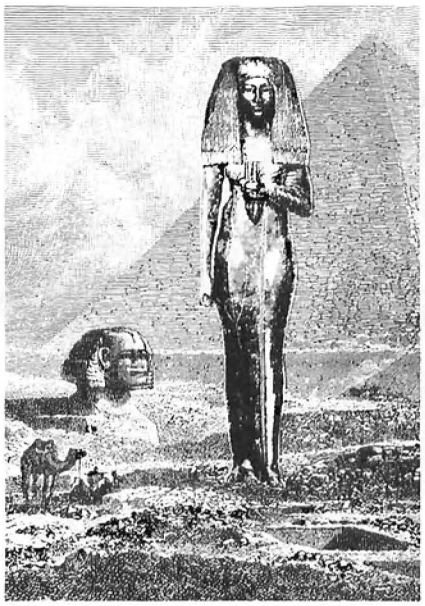
Since the escape route in Bedlam changes each time you load, it isn't always possible to kill the guard dog. To kill the dog, get the hamburger from the refrigerator and put the blue pill in the meat. Then feed the meat to the dog. If the dog dies, then go south. Guards will lock you in a shed. Use the green key to open the door of the shed, and you're free. If the dog doesn't die, you must search for another escape route. The only other way out I know of is through Picasso's painted door. Does anyone know of any others?

Paul Riddle
Linthicum, MD

Pyramid Parts

The coins in Pyramid are past the unpassable pit. To get across, just swing the scepter and a bridge will appear. Swing it again, and the bridge will disappear. Also, if you pick up the gold nugget, you won't be able to go up the stairs.

Jeff Mercer
Gainesville, FL



To locate the treasure chest in Pyramid, first make sure the mummy has stolen some treasure. Then enter the maze, and make the following moves: E, S, S, S, N, E, E, NW. You should be at a dead end with the chest and the stolen treasure. To exit the maze from this point, type SE, N, and D.

Paul Riddle
Linthicum, MD

Madness and the Minotaur

In Madness and the Minotaur, most of the important items that you need can only be obtained if you have two or three other items. To find out what you need to get an item, either look in the pool or ask the oracle if he's present.

Jeff Mercer
Gainesville, FL

Canyon Climber

There's an easy way to get an endless number of points on Canyon Climber. When you get to the second round, press and hold down both the up arrow and right arrow keys, pressing the space bar to jump over any arrows. As soon as you are underneath the ladder, let go of the right arrow key. When you reach the top of the ladder, pause for several seconds, then go back down to the bottom. The Indian's arrows will go right through you, and then all you have to do is tape the space bar down and wait about 15 minutes. The score turns over after 999,990.

Now then, does anyone out there know what an offog is?

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edited by J. Scot Finnie

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Structure Is Everything

SBasic 1.0 is a precompiler that adds 11 structured Basic commands to Color Basic on all versions of the CoCo. You can use it to nest loops of up to 255 levels. It has full compile-time error messages, and the compiler is easily activated.

SBasic adds the following commands and constructs to Color Basic: LOOP. . .UNTIL, WHILE DO. . .ENDLOOP, WHILE DO. . .UNTIL, LOOP . . .ENDLOOP, CASEOF. . .$ . . .ENDCASE, structured IF. . .THEN . . .ELSE. . . ENDIF, CONTINUE. . .QUIT.

The 64K version lets you have source and object codes in memory at the same time, and you can save and retrieve with one keystroke.

SBasic costs $19.95 ($24.95 in Canada) on disk or cassette, plus $3 for shipping and handling ($1 in Ontario and Montreal). For more information, phone or write Tandar Software, 12 Arman Drive, Agincourt, Ontario, Canada, M1T 2P6. 416-293-2014.

Reader Service ✓ 551

CoCo Diagnosis

If you suspect something is wrong with your CoCo, you might want to check out **CoCo Checker**. It will test your ROM, RAM, disk drives and controller, printer, keyboard, cassette, joysticks, sound, PIAs, VDG, internal clock speed, and more.

Spectrum Projects also has a new screen-dump program for Epson and Gemini printers. The **CoCo Screen Dump** offers reverse images with regular or double-size pictures and can use 600 to 9,600 baud.

The CoCo Checker and the CoCo Screen Dump require 16K and cost $19.95 each on tape or disk, plus $3 for shipping and handling. Spectrum Projects, P.O. Box 21272, Woodhaven, NY 11421. 718-441-2807.

Reader Service ✓ 556

Kodak's New Line of 8-, 5¼-, and 3½-inch Disks

Kodak Disk Now Floppy

Kodak disks aren't just for cameras anymore. The company has announced a new product line of floppy disks for mini- and microcomputers. Kodak is forming a new manufacturing division to handle production of its memory products. The suggested retail price for a single-sided, double-density, 5¼-inch Kodak disk is $3.85 in a 10-pack box. Eastman Kodak Company, 343 State St., Rochester, NY 14650.

Reader Service ✓ 561

Stack Packs

Inland Corp. produces a full line of print stands in metal, acrylic, and oak for 80- and 132-column printers. The company has more than 17 styles and sizes of print stands from the most inexpensive and functional metal stands to their top-of-the-line hand-rubbed oak stands. Inland also manufactures monitor holders, disk storage units, surge suppressors, and computer covers. Inland Corp., 32051 Howard, Madison Heights, MI 48071. 800-521-8428.

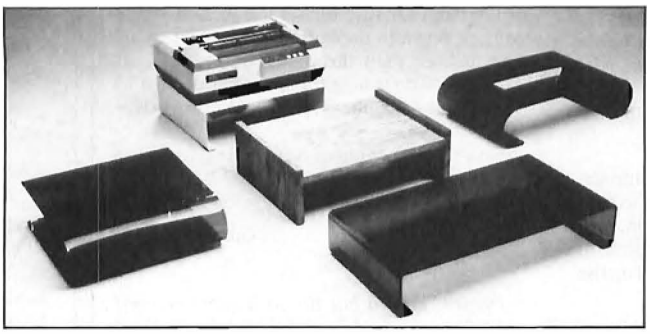
Reader Service ✓ 559

Rembrandt And Ragoona

How about a graphics utility program with advanced features that include circles, ellipses, drawing, painting in 16 patterns, stamps, enlarging, and editing. **Rembrandt** also prints text on the graphics screen, saves and loads pictures, has four text fonts, and a resolution of 256 by 192 pixels. The program includes six sample pictures. Rembrandt requires 32K, joysticks, and Extended Color Basic. It comes on cassette for $24.95 and on disk for $27.95.

Castle Ragoona is a challenging adventure with hi-res graphics, sound, and music. On the flip side of the cassette is a humorous beginner's adventure that has a unique compass. Castle Ragoona requires 32K and Extended Color Basic. It is available on cassette for $24.95. For more information, contact Family Computers, 4047 Bee Ridge Road, Sarasota, FL 33582. 813-921-7510.

Reader Service ✓ 550



Printer Stands from Inland

Buzzing In the Air

CoCo owners who are looking to keep their chips cool can use The Bee Fan. It is powered electrostatically and uses two piezoceramic mylar blades that move five cubic feet of air per minute. This fan has no parts that can wear out.

The Bee has its own built-in dc power supply, so it can't cause starting surges or spikes. Because it is small enough at 2 inches by 3.3 inches by 1.12 inches to fit almost any computer or peripheral, you can hook it up to an internal power source and free up an outlet: It uses 1/15 of the power of conventional rotary fans and produces no electromagnetic or radio interference.

Atmospheres offers a one-year warranty on The Bee Fan, which costs $24.95, plus $3 for shipping and handling. Contact Atmospheres, 1207 Eighth Ave., Brooklyn, NY 11215. 718-788-6799.

Reader Service ✓ 552

Music To Your Eyes

MusiWriter is a new way to organize your musical creativity. If you have a 32K CoCo, a disk drive, and a dot-matrix printer, you can write and edit music on screen, and then print it out with MusiWriter.

MusiWriter can contain up to 10 staves at a time. It gives you treble and bass clefs, 15 key signatures, time signatures from 1/1 to 19/8, rests from full to sixteenth notes, dotted notes and rests, single and double bar lines, and bar lines for the beginning and end of repeated sections. Place notes on any line or space from two ledger lines above and below the staff. Ledger lines appear automatically as you need them. Choose notes of any duration, from double to sixteenth notes.

MusiWriter is a fully interactive, screen-oriented editor. You see the staff on the screen exactly as it is when printed. Edit any part of a staff. You have full cursor control along 60 columns, which scroll with

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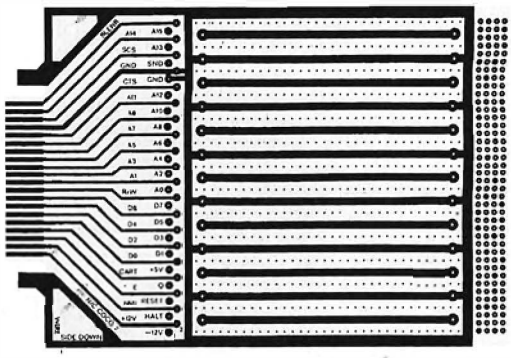
6809 SYSTEM DEVELOPMENT



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Precision molded plastic insert designed specifically to align and support printed circuit cards in the CoCo cartridge slot; an unbreakable removable card guide. Patent Pending.

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COLOR ACCESSORIES

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26-3008 Joysticks	$ 24.95	$ 21.00
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26-1173 Direct-Connect Modem II	$ 199.95	$ 169.00
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See List of Advertisers on page 89

your cursor. You can add, select, or move notation. A comparison-staff feature lets you align notes between staves for multiple-instrument notation.

Tesseract Software Systems will tailor the MusiWriter to your needs. The program costs $50 ($60 in Canada) plus $5 for postage and handling. Write to Tesseract Software Systems, 5350 Montclair Ave., Montreal, Quebec H4V 2L1.

Reader Service ✔ 554

Graphics Support

SGS is a machine-language utility progran that adds 21 easy-to-use graphics commands in support of the semigraphics capabilities of the CoCo. These new commands are similar in format to the Extended Color Basic commands. SGS (SemiGraphics Support) speeds up the execution of circles, rectangles, coloring, animation effects, user-created sounds, and more from an Extended Color Basic or Color Basic Program. The utility provides for full graphics capabilities in five different semigraphic modes and uses up to eight colors on black at a maximum resolution of 64K by 192 pixels.

SGS runs under Extended Color Basic 1.1 and Color Basic versions 1.0 and 1.1. SGS is available on disk for $34.95 and on cassette for $29.95. The price includes a 60-page users manual and a demonstration program. Micro Computer System, 1404 Sunset Drive, Friendswood, TX 77546. 713-996-9477.

Reader Service ✔ 553

New From Tandy

What's more natural for the CoCo than a graphics tablet? Radio Shack thinks so, too. The new Radio Shack **TRS-80 Touch Pad** is produced by Koala Technologies, a forerunner in hardware interface technology (Catalog number 26-1185).

Radio Shack has also just released its new ROM-pack **Sound/Speech Cartridge** synthesizer, which offers sound effects in addition to voice synthesis driven by software you enter yourself (Catalog number 26-3144).

Three more Radio Shack products are available. **Spidercide** is a new ROM-pack game with novel sound effects that tries to catch you in its web before you can shoot your way out (Catalog number 26-3049).

The Electronic Book is a notebook with a 12-key entry pad in the back that plugs into the joystick port. It accepts colorful overlays for little fingers (Catalog number 26-3141). ***The Color Computer Playground*** has 42 program listings that help young kids have fun while learning. The book has 255 pages of big print and easy-to-read program listings (Catalog number 26-3196).

Radio Shack, 1400 One Tandy Center, Fort Worth, TX 76102.

Reader Service ✔ 557

Infocom For the CoCo

Infocom, the well-known text-adventure software game company, has announced that its two newest games, Suspect and The Hitchhiker's Guide to the Galaxy, are available for the CoCo.

Suspect is an intriguing murder mystery in which you find that you are the chief suspect after a murder at a masquerade ball for the wealthy. You arrived as a reporter writing a story for the Sunday Living section of the paper, but you're going to end up in jail if you can't clear yourself.

In **The Hitchhiker's Guide to the Galaxy,** cowritten by Douglas Adams, author of the best-selling novel by the same name, you hitchhike a ride away from impending doom for planet Earth with an Electronic Thumb. Your companion, Ford, is a visitor from another world. The two of you travel through the galaxy, discovering strange places and encountering misadventures. The book's recurring admonition is retained in the game: "Don't Panic."

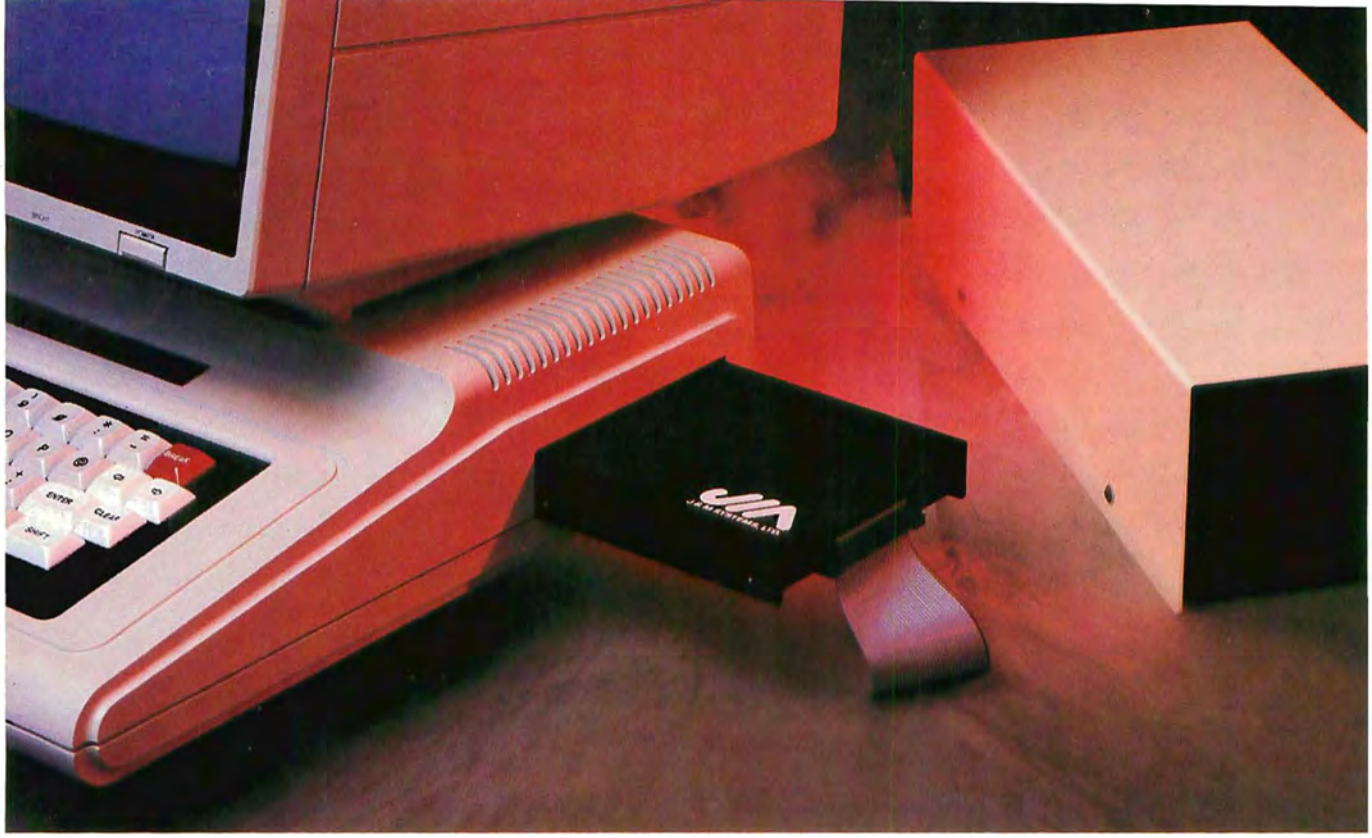
Suspect and The Hitchhiker's Guide to the Galaxy require 32K and are available on disk for $39.95 each. Infocom Inc., 55 Wheeler Street, Cambridge, MA 02138. 617-492-1031.

Reader Service ✔ 560

For CoCo 2 Users

The TRS-80 Color Computer 2 User's Guide is a new book for CoCo 2 owners written by Bill Brewer, Mark Brownstein, and Roger C. Sharp. It has 128 pages, nine chapters, and an index. The book is softcover and sells for $5.95. It is published by Macmillan Publishing Company, 866 Third Ave., New York, NY 10022.

Reader Service ✔ 558



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